



# **NAVAL POSTGRADUATE SCHOOL**

**MONTEREY, CALIFORNIA**

## **THESIS**

### **THE SCOPE OF BACK PAIN IN NAVY HELICOPTER PILOTS**

by

Andrea S. Phillips

March 2011

Thesis Advisor:  
Second Reader:

Michael McCauley  
Quinn Kennedy

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**THE SCOPE OF BACK PAIN IN NAVY HELICOPTER PILOTS**

Andrea S. Phillips  
Lieutenant, United States Navy  
B.A., University of Colorado, 2003

Submitted in partial fulfillment of the  
requirements for the degree of

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March 2011**

Author: Andrea S. Phillips

Approved by: Dr. Michael E. McCauley  
Thesis Advisor

Dr. Quinn Kennedy  
Second Reader

Dr. Robert F. Dell  
Chairman, Department of Operations Research

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## **ABSTRACT**

This thesis investigates issues such as long hours in the cockpit, ineffective seat padding, Night Vision Goggle (NVG) use, and the constant vibrations involved in flying rotary wing aircraft. Pain is subjective and severity is difficult to compare between individuals. Does back pain affect safety of flight? In the military helicopter aviator community, 60–80% of helicopter pilots are estimated to be suffering from back pain (Sargent & Bachmann, 2010). The Sargent and Bachmann article, written by flight surgeons, suggests that back pain is an issue in the helicopter community. This article also suggests that back pain may be affecting safety of flight but did not have data to support that claim. This thesis provides an analysis of the scope, incidence and severity of back pain in the Naval Aviation helicopter pilot community. Of the helicopter pilots who responded to the survey, 88.1% are experiencing back pain during at least 50% of their flights and 34.4% admit this pain is affecting their situational awareness. This thesis gives the Navy information to decide whether to invest R&D funds in anti-vibration seat technology and whether flight safety is affected.

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## **EXECUTIVE SUMMARY**

Back pain in rotary wing aviators is a well-known problem. This thesis investigates issues such as long hours in the cockpit, ineffective lumbar support and seat padding, Night Vision Goggle (NVG) use, and the constant vibrations involved in flying rotary wing aircraft. This thesis provides an analysis of the scope, incidence and severity of back pain in Naval Aviation Helicopter community for NAVAIR.

This research featured a voluntary web-based online survey of winged Naval Helicopter pilots in the following operational wings; HSCWINGPAC/ HSCWINGLANT/ HSMWINGPAC/ HSMWINGLANT, where 37 squadrons were able to participate and 648 pilots completed the survey. The results were eye opening with 88.1% of pilots experiencing back pain during or immediately after a flight, and 416 pilots acknowledging that they are having this pain at least 50% of the time or more. This pain is creating a safety issue because 34.4% of pilots stated that the back pain is at least moderately distracting (3 out of 5 scale) or greater and admit it is affecting their Situational Awareness. Yet only 20.2% of pilots have ever seen a flight surgeon for their back pain related to flying.

The Navy needs to do more to alleviate the issue of back pain in helicopter pilots. The DoN invests over one million dollars to train one Naval Aviator and then puts him or her in a multi-million dollar helicopter with inadequate seating that is creating chronic pain issues.

Addressing the Helicopter Seating System (HSS) issues will result in healthier aviators, increased combat readiness, decreased attrition rates based on chronic pain and injury, decreased time lost from work, increased squadron operational effectiveness by reducing pilots 'med down' time, and decreased health care costs. The cost to DoN medical, lost time and training of active duty helicopter pilots now exceed over \$10,622,500 per year due to HSS deficiencies.

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## LIST OF ACRONYMS AND ABBREVIATIONS

ACGIH .....	American Conference of Governmental Industrial Hygienists
AOM.....	All Officer Meeting
BCA .....	Business Case Analysis
CD.....	Considered Disqualifying
CDD .....	Capability Development Document
CO .....	Commanding Officer
CPD .....	Capability Production Document
DASN.....	Deputy Assistant Secretary of the Navy (Safety)
DoN.....	Department of Navy
EDC .....	EpiData Center
ESG .....	Expeditionary Strike Group
FS .....	Flight Surgeon
HAC .....	Helicopter Aircraft Commander
HAZREP .....	Hazard Report
HFE.....	Human Factors Engineering
HSCWINGLANT .....	Helicopter Sea Combat Wing Atlantic
HSCWINGPAC .....	Helicopter Sea Combat Wing Pacific
HSI.....	Human System Integration
HSMWINGLANT .....	Helicopter Maritime Strike Wing Atlantic
HSMWINGPAC.....	Helicopter Maritime Strike Wing Pacific
HSS .....	Helicopter Seating System
Hz .....	Hertz
ICD.....	Initial Capabilities Document
IRB.....	Institutional Review Board
KPP.....	Key Performance Parameter
MHS.....	Military Health System
NAMI.....	Naval Aerospace Medical Institute
NAVAIR .....	Naval Air Systems Command
NHA .....	Naval Helicopter Association

NPS ..... Naval Postgraduate School  
NSAID ..... Non-Steroidal Anti-Inflammatory Drug  
NVG ..... Night Vision Goggle  
ORM ..... Operational Risk Management  
POM..... Program Objectives Memorandum  
RDT&E ..... Research, Development, Test and Evaluation  
SA ..... Situational Awareness  
TAD..... Temporary Additional Duty  
T&E ..... Test and Evaluation  
TLV ..... Threshold Limit Values  
VA ..... Veteran Affairs  
WBV..... Whole Body Vibration

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# **I. INTRODUCTION**

## **A. BACKGROUND**

This research featured of an online survey of winged Naval Helicopter pilots to determine if back and/or neck pain is an area of concern for the Navy's helicopter pilot community. In July 2005, the author started Navy helicopter flight training in Pensacola, Florida. Immediately, she began to hear the instructors use the term 'helo hunch.' This 'helo hunch' term makes light of the phenomenon of back pain that occurs in the helicopter community. After researching this topic for potential thesis topics, the author found suggestions that the back pain phenomenon was due to a combination of long hours in the cockpit, ineffective seat padding, non-existent lumbar support, Night Vision Goggle (NVG) use, poor flight posture and the constant vibration involved in flying rotary wing aircraft. While pursuing a Master of Science in Human Systems Integration (HSI) at the Naval Postgraduate School (NPS), the author contacted Naval Air Systems Command (NAVAIR) Crashworthy Branch engineers to discuss thesis opportunities covering the topic of back pain in the helicopter community and anti-vibration technologies. NAVAIR desired a research project that would provide statistical data to scope the incidence and severity of back pain in the helicopter community. This thesis is a result of an education in HSI, flying experience and a desire to contribute to a solution to a known problem in the helicopter community.

## **B. HUMAN SYSTEMS INTEGRATION (HSI) CONSIDERATIONS**

The HSI degree program at NPS is a multidisciplinary approach to design and problem solving for the optimization of total system performance and considers the human being the critical component in the design of any complex system. HSI is a field of study that attempts to reduce costs and increase performance by influencing the design of a system across the domains of Human Factors Engineering, System Safety, Habitability, Personnel Survivability,

Manpower, Personnel, Training, and Health Hazards. Out of these eight domains, this thesis focuses on the Human Factors Engineering, Habitability, and the Safety domains of HSI.

Human Factors Engineering – Wickens et al. (2004), describes the goal of human factors engineering as “making the human interaction with systems that enhance performance, increase safety, and increases user satisfaction.” This thesis scopes the incidence and severity of back pain within the Navy helicopter community.

Habitability is a factor in mission readiness. There are military resources that discuss the habitability of shipboard life and Naval Aviation has expanded its definition to include aircraft cockpits. Because pilots are strapped into their seats for multiple hours at a time, the seating must provide an ergonomic environment that supports pilot performance and does not result in pain and discomfort.

Safety: Booher (2003) identified system safety as the inherent ability of the system to be used, operated, and maintained without accidental injury to personnel. This thesis evaluates whether it is common to find accidental injury to the backs of pilots in the helicopter community. It also investigates whether back pain is affecting safety of flight.

## **C. PURPOSE OF THESIS STUDY**

### **1. Research Objectives**

This thesis focuses on the following objectives:

Primary Objective:

- Identify whether back pain is an area of concern with pilots in the Navy Helicopter community.
- Determine the scope, implications and severity of the back pain problem in the helicopter community.

#### Secondary Objectives:

- Provide pilots a means to express ideas on how to improve helicopter seating, flight gear, and NVGs to NAVAIR through a pilot's perspective.
- Identify potential ways to mitigate the hazards associated with the vibrations of flying rotary-wing aircraft.
- Identify and recommend further research

## **2. Pilot's Perspective**

This thesis summarizes the open-ended questions of the survey and provides a pilot's perspective on ways to improve helicopter seating, flight gear, and NVGs as well as medical concerns. The analysis of this thesis provides a pilot's perspective to the engineers of NAVAIR.

## **D. THESIS ORGANIZATION**

The organization of this thesis is as follows:

- I. Introduction: This chapter discusses the motivation behind the author's selection of the topic. Additionally, it provides the research objectives and methodology of the research.
- II. Literature Review: This chapter provides the background for the thesis topic. Within this chapter, the author cites existing research to show the importance of the HSI domains of Human Factors Engineering, Habitability and Safety for understanding the back pain phenomenon within the Navy helicopter community.
- III. Methodology: This chapter describes the participants and administration of the survey utilizing the Dillman method.
- IV. Results: This chapter discusses the data that was collected from the survey in the following categories: demographics, flight hour info, anthropometrics, seat adjustment, seat cushions, back injury, back

pain, distraction (Situational Awareness, “SA”) issues, ranking of reasons for back pain from the perspective of a pilot, flight surgeon, military medical, and alternative medical care. In addition open-ended questions solicited pilots’ ideas, suggested solutions, and further explanations in relation to the thesis objectives.

V. Discussion and Recommendations: The final chapter discusses possible solutions through anti-vibration technologies and medical considerations. The future research areas of interest include enlisted aircrew concerns, updated anthropometric considerations, survival vest improvements, and the recommendation to establish a database to track aviator back pain and injury.

VI. Appendix: The appendixes F through P are summaries of the pilots’ feedback from the open-ended questions of the survey. The topics of loss of feeling in legs and/or feet, HSS adjustment issues, survival vest improvements, NVG use, medical concerns, factors influencing back pain, pain affecting pilot and co-pilot SA, seat design improvements, and aircraft control placement are covered. The feedback comments are included to give the Navy helicopter pilots a voice in matters that are directly affecting them.



## **II. LITERATURE REVIEW**

### **A. BACK PAIN IN AVIATION**

A review of the literature reveals that back pain in helicopter aviators has been known to exist for years and is well documented. Back pain in aviation is a problem across all aircraft types; this thesis focuses on the rotary wing community. Long hours in the cockpit, ineffective seat padding, poor flight posture, NVG use, and the constant vibrations associated with flying rotary wing aircraft all may contribute to the back pain phenomenon.

Two flight surgeons, LT Paul Sargent M.D and LT Angela Bachmann M.D., researched and wrote the article “Back Pain in the Naval Rotary Wing Community” (Sargent & Bachmann, 2010). This research article discusses the anatomy of the back, types of back pain, why it occurs, treatment options, the “NAMI Whammy,” and the price of safety specifically about Navy Helicopter Aviators.

All helicopter pilots are familiar with the term ‘helo hunch’, which refers to an awkward bent forward posture most helicopter pilots assume while flying. In this ‘helo hunch’ posture, the pilot hunches his/her back and places the lower back in an unnatural unstable posture which results in excessive fatigue. When flying the helicopter in a nose up attitude, the pilot must hyperextend his/her neck to see out of the windscreen. Add the weight of the NVGs connected to pilot’s helmet and an additional strain of the neck muscles will occur. These awkward postures from helicopter ergonomics lead to fatigue, overload and pain (Sargent & Bachmann, 2010). Thomae et al. (1998) reported that 82 to 92 percent of helicopter aviators suffer from back pain and that this suffering has an operational impact in an otherwise healthy, young population of aviators (Thomae et al., 1998; Sheard et al., 1996). Other researchers found that back

pain symptoms occurred during flight were reported in 44 to 50 percent of helicopter aviators (Thomae et al., 1998; Sheard et al., 1996; Hansen & Wagstaff, 2001).

Sargent and Backmann (2010) concluded that,

Though back pain in rotary wing aviators is a well-known problem, not enough has been done to alleviate it. The problem affects not only individuals, but also squadron operations, combat readiness, and safety of flight.

It is commonly believed, in the Navy helicopter community, that the new MH-60S helicopter has ineffective seating for the missions that the Navy helicopter pilots are flying. Figure 1 is a picture of the ineffective seat padding.



Figure 1. MH-60S Seat Cushion

This seating is ineffective because it is only a one-inch foam cushion with minimal lumbar support. The foam cushions become uncomfortable after an hour or so because the cushion compresses. The pilots' legs can be pinched by the

metal edge at the front of the seat and cause loss of feeling in the legs of the pilots. This pinching reduces the blood flow from the extremities and can cause compression ischemia.

It is well documented that back pain is distracting (Sargent & Bachmann, 2010). A pilot experiencing a painful distraction while controlling an aircraft could compromise flight safety. The most common distraction is decreased concentration (54 to 66 percent), hurried flight (16 percent), and cancelled flight (seven percent). In addition, up to 12 percent of pilots have reported missing work altogether because of the pain (Bridger et al., 2002).

## **B. NAVY MEDICAL**

The Navy's guidelines for flight surgeons come from the Naval Aerospace Medical Institute (NAMI) in Pensacola, Florida. NAMI provides the guidelines for flight surgeons to follow when returning aviators to flight status. The NAMI guideline for low back pain states, "If symptoms are chronic and/or recurrent, have required hospitalization, and require regular medication beyond occasional Flight Surgeon (FS) approved non-steroidal anti-inflammatory drug (NSAIDs), then the condition is considered disqualifying (CD)." (Sargent & Bachmann, 2010) further explain the low back pain rule of NAMI as,

If the pain is not alleviated within 10 days of treatment with NSAIDS, the aviator will require a waiver to remain on flight status. If the pain is caused by a more serious underlying condition, the requirements are more stringent. If it is determined that the aviator's symptoms are caused by a bulging disk, or other nerve impingement, they will be removed from flight status until they have been asymptomatic for six weeks. Even if they have surgery to remove the bulging disk material, they will not be returned to flight status until they have been asymptomatic for at least six weeks. The further requirement is that they maintain acceptable range of motion and be able to pass a USN or USMC fitness test. If the surgical treatment is more extensive, the grounding may last up to six months for cervical fusions or be permanent for multi-level discectomies. (Sargent & Bachmann, 2010)

Navy pilots avoid going to the flight surgeons out of fear of being ‘downed.’ This phenomenon is commonly known in the Navy helicopter community as the “NAMI Whammy.”

### **C. SAFETY AND HAZREP INFORMATION**

The “Whole Body Vibration Exposure for MH-60S Pilots” study performed for NAVAIR discussed multiple Hazard Reports (HAZREPs) from pilots written due to the poor seating in the MH-60S (Harrer et al., 2009). These HAZREPs are about pain in pilots’ legs and backs. Pain can affect a pilot’s situational awareness and can cause a greater hazard than just sore legs and backs. Situational awareness can decrease with an increase in flight duration due to the constant distraction of pilots shifting their bodies in their seats just trying to get comfortable. From et al. (1987) reported a dose-response relationship between the length of military helicopter flights and back discomfort. He also concluded that this pain is typically dull, over the lower back, and its prevalence and intensity are dependent on the total flight hours of exposure (Harrer et al., 2009). Physical discomfort in the cockpit can lead to inattention and distraction, both of which can contribute to poor decision-making (Shanahan & Reading, 1984).

A HAZREP that the study discussed from HSC-28 included pain in the pilots’ legs and backs of such severity that the pilots had difficulty exiting the aircraft, and in one case, had to be carried out of their cockpit seats.

HSC-28 released a Hazard Report (HAZREP) on 5 April 2005 while conducting Amphibious Search and Rescue missions during seven days of extensive work-ups with the Kearsarge Expeditionary Strike Group (ESG). Approximately four hours into a seven-hour mission, both pilots experienced severe middle and lower back pain, which progressed to numbness and tingling sensations in their feet. After landing, both pilots experienced difficulty exiting the aircraft due to poor circulation in their lower extremities. Both aviators experienced severe back pain several hours later while trying to sleep. Evidence shows that insufficient seat pan cushioning causes a pinching of the sciatic nerve. This results in the legs becoming numb followed by paraesthesia (tingling sensation). In

addition, a lack of lumbar support in the seat cushion leads to spinal support muscle fatigue. (Harrer et al., 2009)

An additional HAZREP the study analyzed occurred on 25 January 2005 from HC-5 (now HSC-25), with pilots reporting pain in their backs and legs as well as being distracted due to shifting in their seats trying to get comfortable.

HAZREP released by HC-5 on 25 January 2005 formally reported that back and leg pain began two to four hours into flight and increased with time. Pilots reported that they were distracted and constantly shifting in their seats trying to get comfortable. Crews reported that after flying a full day, approximately ten hours, the pain took several hours to subside or in some cases lasted one to two days after landing. (Harrer et al., 2009)

Below is a quote from the Commanding Officer of HC-5 in which suggests that the decreased situational awareness was sufficiently severe that the discomfort could cause a mishap.

We have identified a "why" before it has resulted in a mishap or even a near miss. The number of pilots who have reported decreased situational awareness due to discomfort is concerning. In conjunction with the 50 percent mishap reduction campaign, we have been trying to identify human factors that could cause a mishap. This is a prime opportunity to fix the problem before we lose an asset.

HC-5 Commanding Officer

#### **D. HELICOPTER VIBRATION STUDY OF MH-60S**

The 'Whole Body Vibration Exposure for MH-60S Pilots' study performed for NAVAIR, discusses that "the increased mission lengths amplify the pain, stiffness, and general discomfort experienced by MH-60S pilots, forcing aircrews to deal with significant human factors" (Harrer et al., 2009). A large reason for this pain is the whole body vibration (WBV) that is associated with flying rotary-wing aircraft.

This study also reviewed literature and revealed that back pain from the flight posture combined with WBV from the aircraft is associated with increased

lumbar abnormalities and additional medical reporting of chronic back pain by helicopter pilots. The study reports, “helicopter pilots have a prevailing amount of back pain due to the required posture and/or WBV from the aircraft” (Bonger et al., 1990). Several studies were reviewed and have identified that the “back pain is extreme localized pain at the lumbar region and/or buttocks, which can increase the potential of nerve compression” (Froom et al., 1986; Froom et al., 1987; Sheard et al., 1996; Shanahan et al., 1984). Additionally, “helicopter pilots have reported chronic back pain and sought medical treatment, even though they risk their flight status being revoked” (Bonger et al., 1990). In 1984, Aviation Space Environmental Medicine published an article that documented “that when compared to jet pilots, rotary wing pilots have an increased incidence of lumbar abnormalities” (Froom et al., 1984). Additional research showed that, “back pain becomes chronic as exposure increases to rotary wing flight conditions” (Bonger et al., 1990). When studying back muscles in a laboratory setting, the results have shown that back muscles respond proportional to vertical (z-axis) WBV at the frequency range produced by helicopter (Seidel, 1988; Seroussi et al., 1989; Harrer et al., 2009).

In regards to whole body vibrations, prolonged exposure may cause permanent physical damage that affects the lower spinal region. The most damaging frequencies are those in the resonance frequencies of the spinal column. Figure 1 illustrates the vibration resonance for the spinal column, occurs between 10 and 12 Hertz (Hz) (Bruel & Kjaer, 1989). The American Conference of Governmental Industrial Hygienists (ACGIH) was used in the Harrer et al., (2009), study to determine the vibration Threshold Limit Values (TLV) for the MH-60S pilots. Their study compared three different seats; the current seat, anti-vibration seat A, and anti-vibration seat B. Vibration loads were measured to determine whether the pilot was being overexposed to vibration thresholds. When studying vibration, there are three primary axes X, Y, and Z, as shown in Figure 2. The Z-axis runs vertically through the body in a standing or seated position (Seidel, 1988; Seroussi et al., 1989).

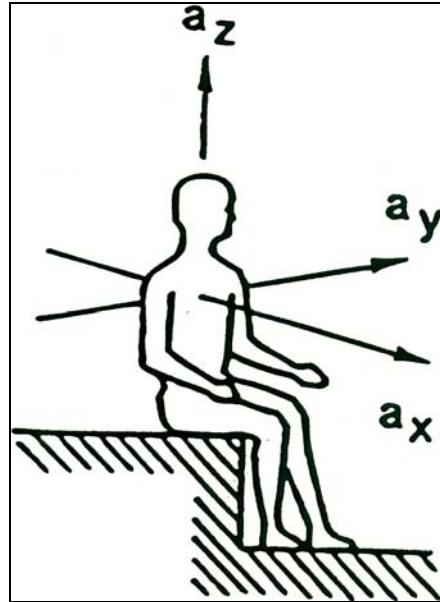


Figure 2.      Vibration Axes

Figure 3 shows that resonance occurs in the spine at the 10-12 Hz range. The Harrer et al., (2009) study looked at vibrations in the 0-80 Hz range but focused near the 10-12 Hz range in the Z axis, because that is most relevant for back pain.

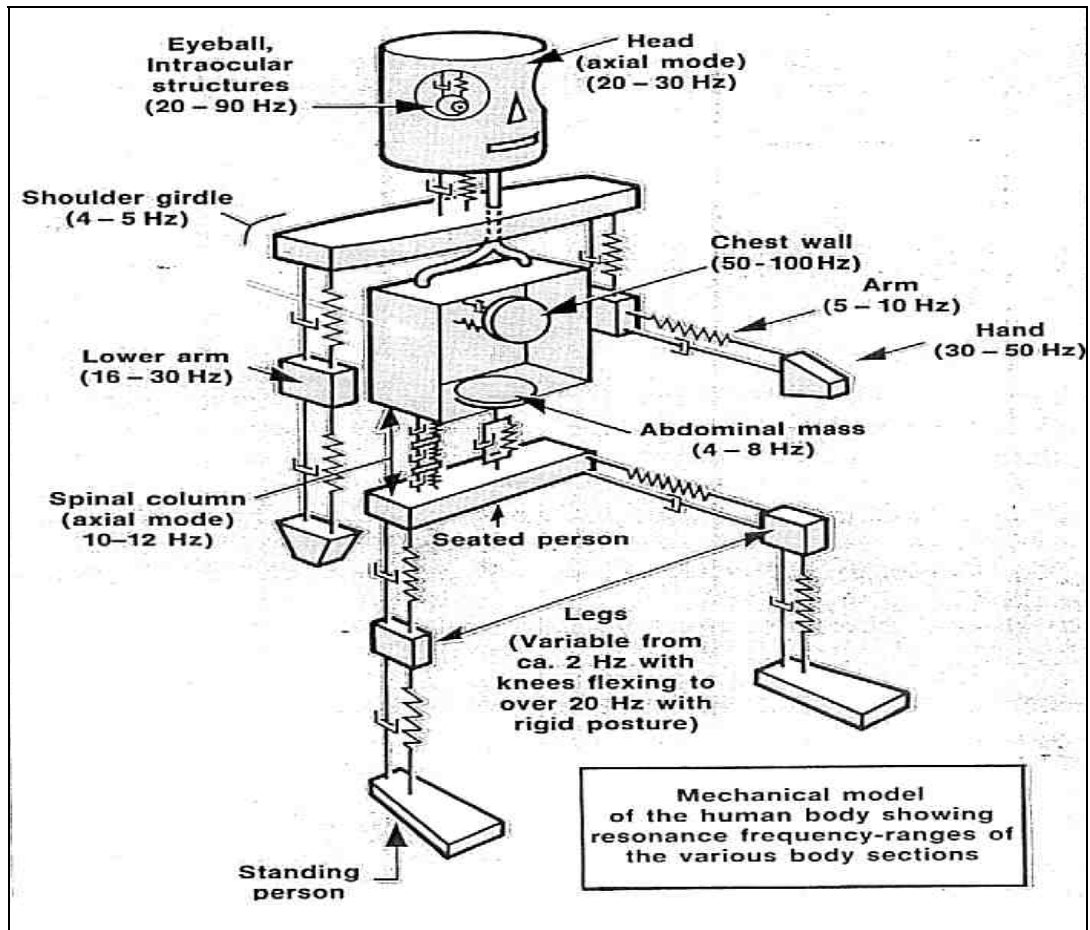


Figure 3. Mechanical spring model

Figure 4 shows the results of the data collected from the Harrer et al., (2009) study. The damaging range of resonance for the spine, 10–12 Hz, is annotated by the red dotted lines. The hourly threshold curves were calculated using the ACGIH standards. The current seat nearly pierces the 4 hr threshold value at the 16 Hz level. Any flight in the MH-60S that is greater than 4 hours overexposes the pilot to WBV vibration limits. The current seat also performs poorly through the 10-12 Hz range and absorbs less vibrations than Anti-vibration seat A. Anti-vibration seat B does not pierce through the vibration threshold until the 8-hour limit but performs the worst through the 10–12 Hz range. Anti-vibration seat A performs the best through the 10–12 Hz range by absorbing the most WBV energy compared to the other seat cushions. Also, it does not pierce



the thresholds until the 16-hour limit, and would be within the threshold limits for up to a 10-hour flight. With additional auxiliary fuel tanks and extended ranges, helicopter seats need to be tested for the maximum time a pilot is to be strapped in before being exposed to vibration loads that are damaging their backs.

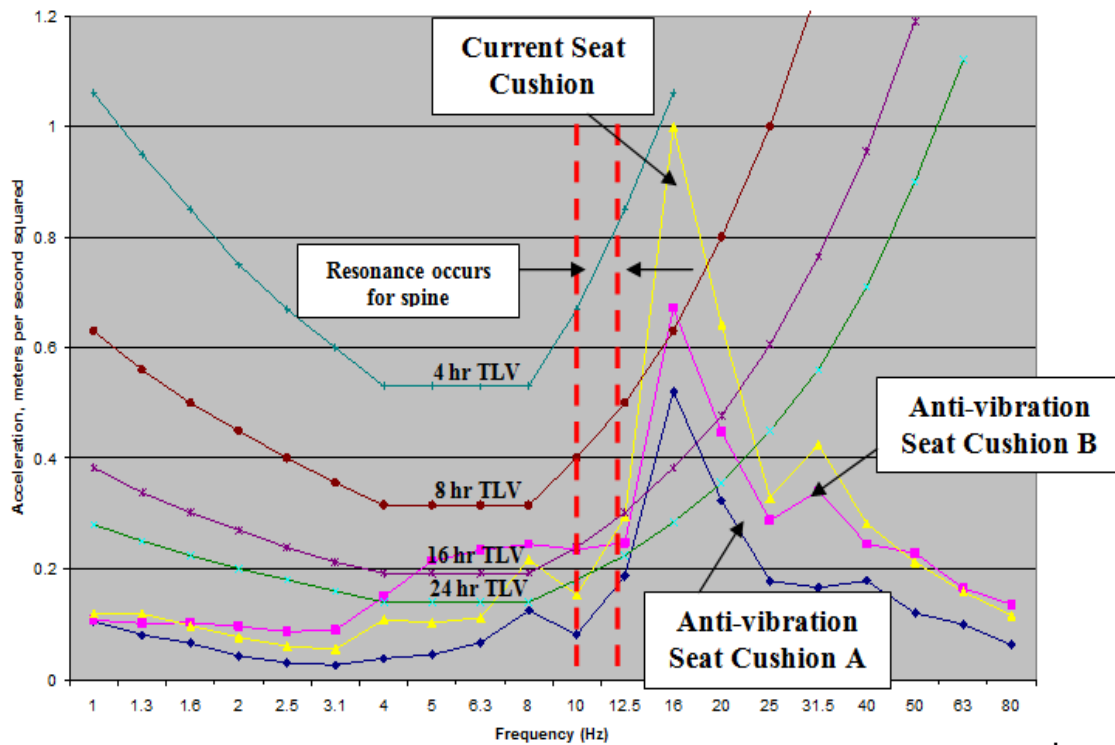


Figure 4. Vibration Study Results (Harrer et al., 2009)

The Commission of European Communities have stricter WBV standards than the United States. The Harrer et al., (2009) study also looked at the European Standards, in which  $0.5 \text{ m/s}^2$  is the recommended action level by the Commission of European Communities. When using European standards, the MH-60S pilot is receiving 300% of recommended WBV and well above the threshold limit. See Figure 5 for the results in the Z-axis. (Harrer et al., 2009)

<b>Weighted Results</b>			
	<i>X-axis</i>	<i>Y-axis</i>	<i>Z-axis</i>
<b>Original Seat Cushions</b>	0.21 m/s <sup>2</sup>	0.20 m/s <sup>2</sup>	1.38 m/s <sup>2</sup>
<b>Anti- Vibration 'A' Cushions</b>	0.20 m/s <sup>2</sup>	0.19 m/s <sup>2</sup>	0.88 m/s <sup>2</sup>
*** 0.5 m/s <sup>2</sup> is the recommended Action Level by the Commission of European Communities			

Figure 5. WBV Results (Harrer et al., 2009)

Figure 6 provides an example of the current seat cushion and an 'Anti-vibration' cushion. Notice the lumbar support of the current seat cushion.



Figure 6. Current Seat vs. Anti-vibration seat

## E. KADIX SYSTEMS BUSINESS CASE ANALYSIS

The Navy engaged Kadix Systems to provide a business case analysis for improvements to the Navy Helicopter Seat System. Kadix Systems administered a survey through Naval Helicopter Association (NHA) and received surveys from

current pilots, current aircrew, post-service pilots and post-service aircrew from the Navy and Marine Corps about six different helicopter seat systems (HSS); UH-1, AH-1, H-46, C/MH-53, H-60, and TH-57. This Business Case Analysis (BCA) identified issues with the HSS, summarized their survey data, performed a cost baseline of medical costs to the military due to HSS, and provided some recommendations and conclusions. The BCA states that:

In October of 2009, the Deputy Assistant Secretary of the Navy (Safety) (DASN (Safety)) contracted a Business Case Analysis (BCA) to investigate and document Department of Navy (DoN) Helicopter Seat System (HSS) deficiencies because current DoN Pilot and Crew Seating designs may adversely impact Safe mission performance while contributing to excessive human costs, material and medical costs, comfort, fatigue, and endurance as well as overall mission readiness. The aircraft to be included in this study are AH-1, UH-1, H-46, C/MH-43, H-60 and TH-57 classes. (Kadix, 2010)

The BCA looked at translating their results into dollar amounts by addressing five cost areas: Medical, Time Lost, Disability, Training and Mishap. "Costing was based on survey results, information from DoN Public Health Center (NMCPHC) EpiData Center (EDC) and various Government Reports." (Kadix, 2010)

*Medical Baseline:* Calculates overall medical costs based on 9,789 medical injuries occurring in the DoN helicopter pilot and aircrew population from 01 January 2002 to 31 December 2009.

*Time Lost Baseline* Calculates the expenditure, in terms of salary dollars, of the days for which rotary wing aviators experience limited duty related to medical injuries.

*Disability:* Although the Post-Service Survey validated there are pilots and aircrew receiving disability benefits due to HSS injuries, costs could not be established as no response to the Veterans Affairs Data Call was received.

*Training Baseline:* Calculates the dollar cost of putting new pilots and aircrew through a \$1Million training program to replace those who retire early due to HSS-related injuries.

*Mishap Baseline:* Costs could not be established, as there was no direct documented corollary between mishaps and HSS configurations. (Kadix, 2010)

One of the objectives of the BCA was to establish a preliminary cost baseline to quantify the costs associated with HSS. These costs include direct and indirect costs to DoN due to injuries and chronic issues from HSS design deficiencies. The direct and indirect costs include surgery costs, chiropractor visits, lost time at work and training and out-of-pocket personal costs. The BCA collected information from pilots and aircrew related to HSS safety, comfort, operation, performance, fatigue, pain, endurance, alertness and potential improvements (Kadix, 2010). Table 1 shows the data from the BCA that looks at the cost to the Navy of only pilots from HSS deficiencies. The BCA also address aircrew costs but for the scope of this thesis, only pilot data was used.

Table 1. Annual Cost for Pilots due to HSS Deficiencies (Kadix, 2010)

Annual Costs	Pilot
Medical	\$421,210
Lost Time	\$2,546,881
Disability	Not available through VA
Training	\$7,654,412
Mishap	Not available
Total Baseline Cost (pilots only)	\$10,622,503

Table 2 is the Total Lifecycle Cost (5 YR with inflation) for HSS deficiencies with Medical, lost work time, lost training time, but does not include disability and mishap costs.

Table 2. 5 YR Life Cycle Cost for Pilots due to HSS Deficiencies

Pilot Only - 5 YR Life Cycle Costs	5-YR Life Cycle (with inflation)
Medical Costs for HSS deficiencies	\$2,175,019
Lost Time	\$13,151,420
Lost Training Time	\$39,525,354
<b>Total Life Cycle Costs (5 YR)</b>	<b>\$54,851,793</b>

The BCA survey was divided into two surveys: one for in-service and one for post-service. Their survey had three objectives:

- Identifying types of pain, discomfort and other medical problems experienced by helicopter Pilots and Aircrew in subsets of demographic information.
- Quantifying cost associated with medical attention avoided or sought outside of the MHS
- Identifying resources for HSS improvements (Kadix, 2010)

The BCA survey had 1,714 responses but it included pilots, aircrew both in-service and post-service from the Navy and Marine Corps. One issue that the BCA addressed was that 59.23% of In-Service pilot and aircrew are avoiding medical attention out of fear of losing flight status; this avoidance may be the reason that pain becomes chronic in the helicopter community due to lack of treatment (Kadix, 2010). The BCA divided its HSS deficiency data into three categories: Posture, Vibration and Workload. The data discusses that “the independent impact, as well as the combination of these factors, creates a hostile environment for helicopter Pilots and Aircrew and sets the stage for long-term chronic pain and health issues” (Kadix, 2010). The ‘helo hunch’ was discussed under the topic of posture. The leading factor of the ‘helo hunch’ was the problematic angle of cockpit components. The other factors that contribute to the ‘helo hunch’ were: angle of seat, placement of controls/equipment required for operation, helmet size/weight and/or gear too bulky for the originally designed

seat. Vibration was found to be creating unacceptable levels of health risks and a causal factor for neck, back and limb injury.

The recommendations included an analysis of alternatives. Some of the alternatives included: Use of lumbar and seat supports as well acquiring new helicopter seat systems and/or a Cockpit Re-Design. The recommendation was for the acquisition and design requirements that should be included are:

- Controls geometry (ergonomic placement)
  - Changing the posture of the Pilot
  - Changing the lumbar support
  - Reducing vibration through the seat devices
  - Augmentation of aircraft stability
  - Modifying pilot and aircrew gear (NVG, Vests)
- (Kadix, 2010)

## **F. SUMMARY**

After discussions with NAVAIR, review of literature, analyzing the Harrer et al. (2009) vibration study, and reviewing the Kadix (2010) BCA, it seems that back pain is a problem in the Naval Aviation Community. NAVAIR desired a research project that would provide statistical data of the scope, incidence and severity of back pain specifically for the Naval Aviation Helicopter Pilot Community. The author took the project a step further to include implications and provided a means for pilots to give their perspective of safety of flight issues as well as suggestions/feedback on HSS and flight gear.

### **III. METHODS**

#### **A. METHOD OVERVIEW**

In an effort to scope the back pain problem within the Naval Aviation Helicopter Community, an anonymous electronic survey was distributed to active duty operational squadrons in the HSCWINGPAC, HSCWINGLANT, HSMWINGPAC and HSMWINGLANT wings. See Appendix A for the survey questions. The author wanted to ensure complete anonymity of the pilots and therefore designed a distribution method of the survey through the Safety Officers of each command. A web-based link to Survey Monkey was established and forwarded to each of the Safety Officers, who then forwarded the link to their 'All Pilots' distribution folder within each squadron.

Out of the 43 squadrons within all four wings, 37 elected to participate. The seven squadrons that did not participate were deployed and having bandwidth issues associated with being onboard a Navy ship. Of the 37 squadrons, there were a total of 1028 pilots assigned and 651 pilots elected to complete the survey. This 63% completion rate is outstanding considering the survey was only open for one workweek and was voluntary with no records of names or e-mail addresses. The limited period that the survey was open was due to NPS graduation timeline.

The author, requested permission to do the survey at the Commodore level of the four type helicopter wings HSCWINGPAC, HSCWINGLANT, HSMWINGPAC and HSMWINGLANT. See Appendix B for request to Commodores. After receiving permission from the four Commodores, the author established contact with the 43 Squadron Commanding Officers, via e-mail the week prior to the survey launch to provide an executive summary and an explanation of 'why' the survey needed to be forwarded by their Safety Officer (or designated personnel) to protect the pilots' anonymity. See Appendix C for request for volunteers to COs and Safety Officers. The executive summary

provided information on the objectives of the survey, promoted the survey as a pilot putting a survey together for pilots to collect data for the NAVAIR engineers. The author attempted to cultivate an ideology of 'it's for us by us,' and asked the COs to discuss the future survey at their All Officer's Meetings (AOMs) prior to the launch. This initial communication was key to the success of the survey, because it created anticipation and gave pilots a "heads up" that the survey was an opportunity to provide suggestions and recommendations to the NAVAIR engineers. Considering pilots in these operational commands could also be on leave, Temporary Additional Duty (TAD), and/or on deployment, having 648 pilots fill out the survey surpassed expectations and suggests that back pain in the helicopter community is a 'hot topic'. The survey included 55 total questions to include the 13 open-ended questions and took approximately 15-20 minutes to complete. Out of the 648 pilots who filled out the survey, 91% (593 pilots) took the time to write open-ended responses, which again suggests that this topic is important to them.

## **B. PARTICIPANTS**

There were 43 Naval Aviation squadrons in the HSCWINGPAC/ HSCWINGLANT/ HSMWINGPAC/ HSMWINGLANT invited to participate in the Navy Helicopter Back Pain Survey. Due to operational commitments and/or shipboard bandwidth issues with the web-based survey link, 37 were able to participate. The total number of pilots assigned to the 37 squadrons was 1028; 648 pilots completed the survey for a 63% response rate. The pilots were asked to take the survey voluntarily and give informed consent prior to taking the survey. See Appendix D for request for volunteers and Appendix E for informed consent.

### **1. Demographics**

There were 648 Naval Aviation Helicopter Pilots who took the survey, which included 573 male pilots (88.4%), 69 female pilots (10.6%), and 6 pilots



(0.9%) who did not answer the gender question. The pilots' total flight hours averaged at 1311.4 flight hours. Table 3 shows the total breakdown of pilot and total flight hour averages.

Table 3. Demographics of the Participants

**DEMOGRAPHICS**

Gender	Total Participants	Gender %	Flight Hour Mean	Median	Mode	Stand Dev	Minimum	Max
Men	568	88.5%	1308.5	1100.0	2000	891.002	225	5900
Women	68	10.6%	1088.2	850.0	1000	794.520	200	4000
NGG	6	0.9%	1537.5	1437.5	2600	970.535	550	2600
Totals	642	100.0%						
Total Average			1311.4	1129.2	1866.7	885.352	200.0	5900.0

NGG = No Gender Given

6 pilots did not give flight hour info

The survey asked pilots to estimate their flight hours in several categories; Total Flight Hours, Single-Engine Helo, Multi-Engine Helo, Multi-Engine Fixed Wing and which airframe the pilot had the most flight hours, H-46, H-53, TH-57, or H-60. This question was asked because of the diversity of the helicopter training pipeline and follow on flying tours available as helicopter pilots or C-12 pilots. Table 4 shows the flight hours in the categories and percentage of pilots in each airframe. The airframe that the pilot identified as having the most flight hours in was considered their 'primary platform' for the purposes of this study. Due to pilots estimating total flight hours, and then estimating the hours in the various categories, all the averages do not necessarily add up to 100%. Regardless of gender, pilots had the most flight hours in multi engine helicopters.

Table 4. Flight Hours Diversity Chart

**FLIGHT HOUR DIVERSITY**

	Mean Years Flown for Navy	Years (sd)	Mean Single Engine Helo Flight Hours	Single Engine (sd)	Mean Multi Engine Helo Flight Hours	Multi Helo (sd)	Mean Multi Engine Fixed- Wing Flight Hours	Multi Fixed- Wing (sd)
Men	7.6	4.843	179.9	304.253	972.5	765.863	38.0	134.312
Women	6.2	3.767	158.5	296.701	735.1	565.508	72.8	209.480
NGG	7.7	3.882	346.3	483.767	1108.7	837.664	20.8	51.031
<b>Averages</b>	<b>7.2</b>	<b>4.164</b>	<b>228.3</b>	<b>361.574</b>	<b>938.7</b>	<b>723.012</b>	<b>43.9</b>	<b>131.608</b>

NGG = No Gender Given

**2. Anthropometrics**

The pilots were asked to disclose demographic data in the following categories: gender, height in inches, and weight in pounds. Table 5 depicts the pilots' height in inches and shows that there is a wide range in pilot height, Table 6 provides information regarding the pilots' weight and indicates that there also is a lot of variability in weight among both male and female pilots. Pilots also were asked to disclose if they were 'disqualified' to fly any aircraft in flight school due to their anthropometric measurements. All Navy pilots have their anthropometric data analyzed to ensure proper fit in the assigned aircraft. Of the 648 pilots surveyed, 78 (55 male, 23 female) stated they were disqualified from flying an aircraft due to anthropometric measures. Table 7 provides the number of pilots who were disqualified due to anthropometry by aircraft. Pilots were asked to check all the anthropometric measures that applied to their disqualification status.

Table 5. Height in Inches – Anthropometrics

**Height in Inches - Anthropometrics**

	Number of Pilots	Mean	Median	Mode	Stand Dev.	Range	Minimum	Max
Men	573	71.0	71	72	2.505	19	60	79
Women	69	66.3	66	65	2.593	12	60	72
NGG	6	68.5	69	70	3.674	10	64	74
<b>Averages</b>		<b>68.6</b>	<b>68.7</b>	<b>69.0</b>	<b>2.924</b>	<b>13.7</b>	<b>61.3</b>	<b>75</b>

NGG = No Gender Given

Table 6. Weight in Pounds – Anthropometrics

**Weight in Pounds - Anthropometrics**

	Number of Pilots	Mean	Median	Mode	Stand Dev.	Range	Minimum	Max
Men	573	186.9	185	175	23.385	150	115	265
Women	69	148.1	145	145	17.979	95	110	205
NGG	6	184.2	185	N/A	45.762	130	115	245
<b>Averages</b>		<b>173.0</b>	<b>171.7</b>	<b>160.0</b>	<b>29.042</b>	<b>125.0</b>	<b>113.3</b>	<b>238.3</b>

NGG = No Gender Given

Table 7. The Number of Pilots Disqualified per Airframe

**Airframes of Disqualified Pilots**

Aircraft	Arm Length	Sitting Height	Knee to Buttocks	Overall Height
E-2/C-2	6	12	7	1
EA-6B	4	19	12	2
F-18	3	10	12	1
P-3	2	3	1	1
C-130	2	2	1	1
H-53	0	2	1	0
H-60	0	2	1	0

Out of 78 pilots (55 male and 23 female)

Respondents could annotate every reason for disqualification

The most frequent reason for disqualification due to anthropometric measure was sitting height, followed by knee to buttocks length, and then arm length.

## C. MEASURES

The survey consisted of 55 questions, tailored specifically for the research objectives of this thesis. The primary purpose of this survey was to investigate whether there is a back pain problem in the Navy helicopter community, and if so, the scope, incidence and severity of the problem. The secondary purpose was to identify potential ways to mitigate the health hazards associated with

flying rotary-wing aircraft, provide a means for pilots to express ideas on how to improve HSS and their flight gear, and identify further research. The survey was composed of 42 closed-ended questions and 13 open-ended questions. The closed-ended questions were designed to give data to NAVAIR and rating scales were included as an attempt to quantify the problem. The multiple open-ended questions were designed so that pilots could give suggestions and explanations of their experiences with flying with back pain, medical, gear issues, flight profiles and anthropometrics and seat issues all in the realm of back and/or neck pain. Appendix A is the survey questions.

#### **D. PROCEDURES**

The NPS Institutional Review Board (IRB) approved this study. The survey was conducted via the Internet on Survey Monkey, which enables users to create their own Web-based surveys. A pilot study was conducted to verify that all survey questions were pertinent to active duty winged Naval Helicopter pilots. The survey was distributed through the Safety Officers' in each of the 37 squadrons forwarding the e-mail with the link to the survey to their 'All Pilot' distribution list. The Safety Officers' then reported to the author that the survey had been sent and the number of pilots in their respective squadrons. Three days after the original launch of the survey, a 'last-call' e-mail was sent out to the Safety Officers to forward to their pilots as a reminder to any pilot who did not yet have an opportunity to participate. A final thank you for participating e-mail was sent. The entire survey took approximately 15–20 minutes to complete.

## **IV. RESULTS**

### **A. PRIMARY OBJECTIVES**

The results section focuses on the primary objectives of this thesis, which are to identify if back pain is an area of concern with pilots in the Navy Helicopter Community and if so, the scope, implications, and severity of the back pain problem. The secondary objective of providing a means for pilots to express their ideas on HSS, flight gear and NVGs is also covered.

#### **1. Back Pain Statistics in the Navy Helicopter Community**

Of the 632 pilots who responded to question 20, which asked if the pilot had any back injuries NOT related to flying, 85 or 13.4% stated that they did have a back injury not related to flying. The majority of these injuries were due to lifting an object incorrectly or sports related. This result is important because it indicates that the cause of most pilots' back and neck pain is due to flying rather than other activities.

Of the 631 pilots who responded to question 22 (Have you ever experienced back and/or neck pain during or immediately following a flight?), 556 pilots or 88.1% stated that they have experienced pain during or immediately following a flight. Of those 556 pilots experiencing pain, 98.7% state that they were not performing any maneuvers in the aircraft that were out of the ordinary. The lower back was the most frequent area of pain with 86.2% of pilots experiencing lower back pain, followed by 48.7% experiencing neck pain. Of the 546 pilots who provided information regarding the frequency of pain, 416 pilots stated they are having pain 50% of the time or more often (see Figure 7).

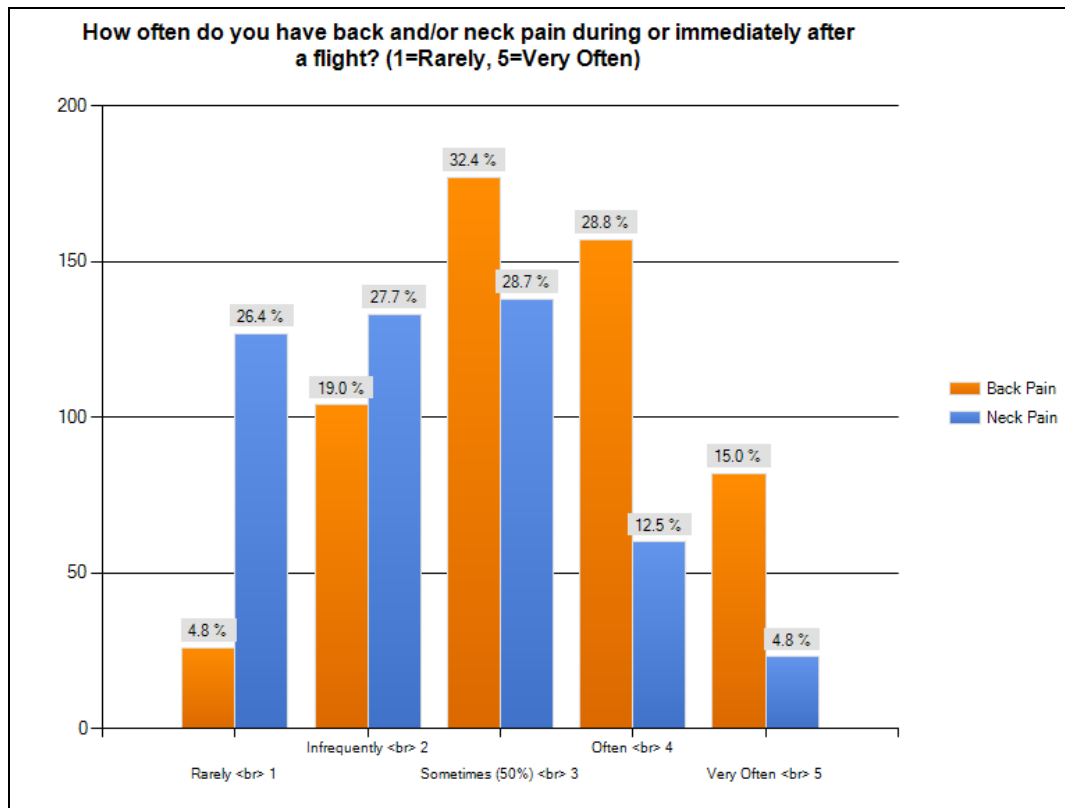


Figure 7. Back/Neck Pain During or Immediately After Flight

## 2. Leg and Feet HAZREP Concerns

There have been several HAZREPs of pilots' legs and feet going numb or tingling sensations while flying. Of the 614 pilots who responded to the question, "Have you ever experienced numbness or loss of feeling in your legs and/or feet during or immediately following a flight?" One hundred and seventy (27.7%) pilots indicated 'Yes'. If the pilots responded 'Yes', they were asked to explain their experience of numbness or loss of feeling in their legs and/or feet. Of the 170 pilots asked to explain their situation, 169 (99.4%) pilots completed the open-ended question. See Appendix F. One pilot wrote, "Primarily loss of feeling in legs during flight. Padding in seat insufficient to relieve point pressure of thighs. Blood flow stops at the harness leg straps and just above the knees

(edge of seat).” Another pilot wrote, “On many occasions, I’ve stumbled for the first 10 yards walking from the helo to hangar because my legs and back have sort of ‘frozen’ in position.”

### 3. Situational Awareness – Pilot

Over 50% of these pilots disclosed that they perceive the pain at least moderately distracting (3 out of a 5 point scale) or greater and 34.4% admit it is affecting their Situational Awareness in flight.

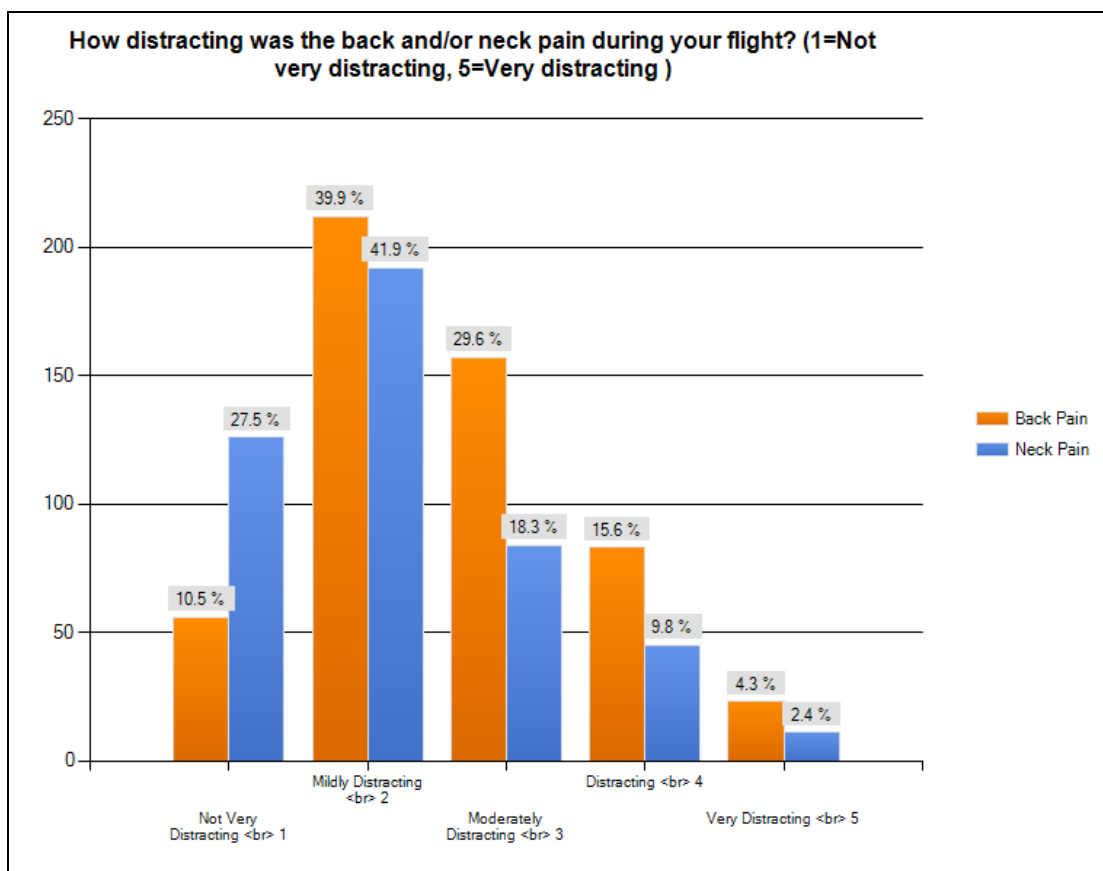


Figure 8. Back/Neck Pain Distracting to Pilot

### 4. Situational Awareness – Co-pilot

There were 368 (58%) of pilots stated that they had flown with a co-pilot who was flying with back and/or neck pain. Of these 368 pilots, 43.2% stated

that the pain did affect the co-pilots Situational Awareness in flight. The pilots stated that 153 co-pilots (42%) were at least moderately distracted (3 out of a 5 point scale) or greater.

## **5. Medical**

Of the 619 pilots who responded, 63.8% say they are concerned about 'downing' themselves if they went to the flight surgeon and 81.8% state they would wait until the pain at least Mildly Extreme (4 out of a 5 point scale) before seeing the flight surgeon. Considering that 86.2% of pilots are flying with back pain at least 50% of the time, it is noteworthy that only 20.2% of pilots have ever seen a flight surgeon or military medical doctor for back pain related to flying. Only 14.1% of the 619 pilots have ever been 'downed' for back pain. Out of the 136 pilots (88 back pain only, 11 neck pain only, 37 both neck and back pain), who have gone to see a flight surgeon 87 pilots (64%) were 'downed' due to their pain. Although the 64% 'downed' rate may seem high, out of the 87 pilots who were 'downed', 84% stated they saw the flight surgeon when the pain was mildly extreme (4 out of 5 scale) or greater. Of the 617 pilots who responded to question 44 (Have you ever seen a doctor outside of the military because you didn't want to 'down yourself' for back and/or neck pain?), 13.3% stated that they had seen a doctor outside of the military medical system. Of the 615 pilots who responded, 45.4% are using over-the-counter pain relievers for back and/or neck pain.

Several questions in the survey inquired about chiropractic care, of the 616 respondents, 213 (35%) had seen a chiropractor (96 through the military, and 117 through civilian care). Of those who had seen a chiropractor, 80.1% stated, "Yes, my pain was reduced after chiropractic care."

## **6. Pilot Rankings**

The Pilot Rankings are pilot perspectives as to what is contributing to their pain. The pilots were given 10 choices and asked to rank them 1 to 10 (one being greatest contributor to pain and 10 as the least contributor to pain). Of the



612 pilots that participated in the question, the greatest reason pilots believe is contributing to their back pain is “Flight Posture ‘helo hunch’ with a mean of 2.4, followed by Long flights (4+ hours) with a mean of 3.04, followed by Seat/Cockpit ergonomics with a mean of 3.1.

Table 8. Pilot Rankings

Rank the following items as to their contribution to back and/or neck pain  
(1 = Biggest reason for pain and 10 = Least reason for pain)

Rank	Reason	Mean
1	Flight Posture 'helo hunch'	2.40
2	Long flights (4+ hours)	3.04
3	Seat/Cockpit Ergonomics	3.10
4	NVG use	4.70
5	Flight Survival Vest	5.19
6	Aircraft Vibrations	5.28
7	Body Armor	7.18
8	Hard Landings	7.71
9	Shipboard Landings	8.00
10	Tactical Landings	8.52

## B. SECONDARY OBJECTIVES

This section discusses one of the secondary objectives, of providing pilots a means to express how to improve HSS, flight gear, and NVGs

### 1. HSS Issues

The HSS Issues include adjusting the seat fore and aft, height adjustment, reaching required switches, being able to bottom the collective while still being to see well over the dash, condition of seat cushions, and supplemental seat cushion use. See Appendix G for HSS Adjustment Issues.

Of the 614 pilots that responded about seat adjustment concerns and issues were; 146 (23.8%) stated being able to bottom the collective and see well

over the dash, 145 (23.6%) stated that reaching all the switches, and 136 (22.1%) indicate that the cyclic gets in the way.

When questioned about the condition of the seat cushions in their primary platform aircraft, 628 pilots responded and 555 (88.4%) indicate that the lumbar support is insufficient and 497 (79.1%) thought that the padding is too thin. See Figure 9 for the results.

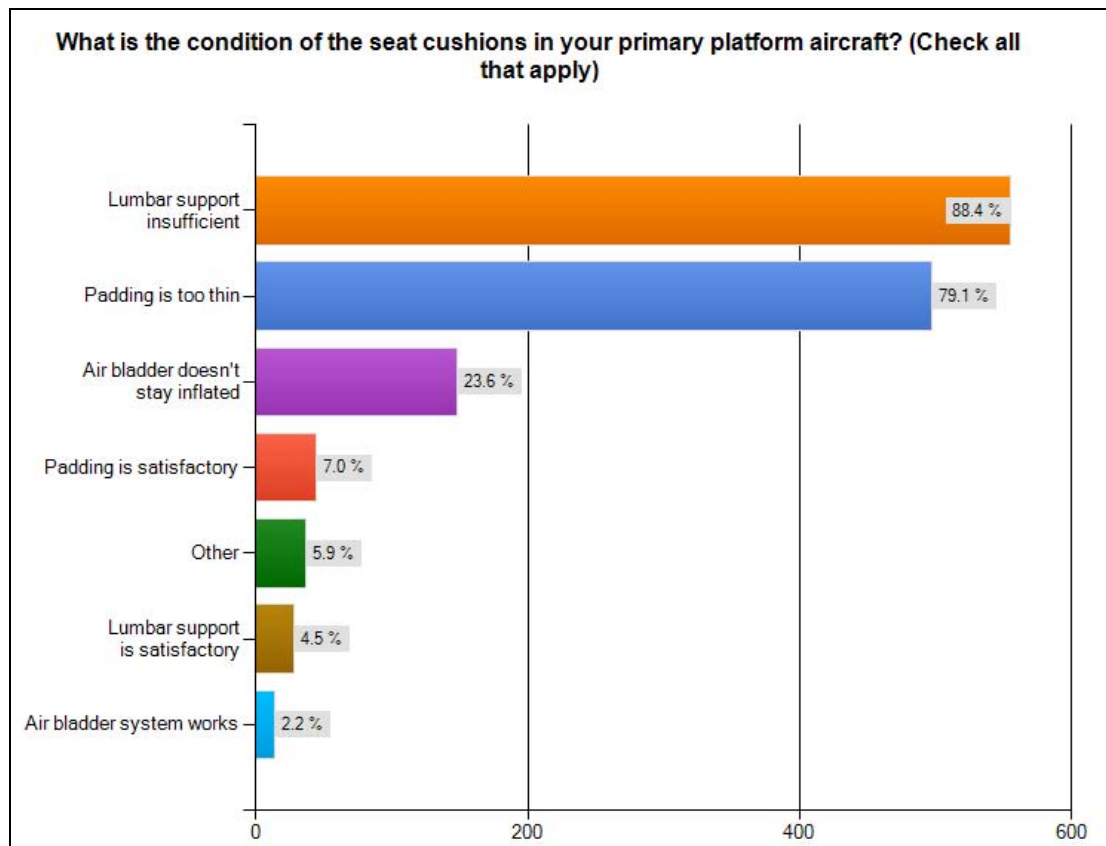


Figure 9. Aircraft Seat Cushion Conditions

Due to the poor condition of the aircraft seat cushions, some pilots are purchasing supplemental seat cushions to use in their aircraft. Of 632 pilots, 200 (31.6%) pilots indicated using supplemental cushions. It is noteworthy to state that not all Navy pilots are authorized to use supplemental cushions; supplemental cushion use is dependent on aircraft type. Of the 200 pilots who

do use supplemental cushions, 146 (73%) responded that the supplemental seat cushion helped alleviate back and/or neck pain.

## **2. Flight Gear Improvements**

See Appendix H for pilot feedback on the survival vest. The majority of the responses requested that the weight of the gear be reduced with suggestions on how to accomplish the weight reduction. Several feedback responses suggest the gear is too extensive and includes many unnecessary items. The pilots request for personal responsibility and flexibility to choose what gear to take for their particular flight mission and not be required to take all the gear on the vest for every flight.

## **3. NVG Improvements**

See Appendix I on pilot feedback for NVGs. The majority of the comments were about ensuring that commands have weighted battery packs to help balance the weight of the NVGs.

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## **V. DISCUSSION AND RECOMMENDATIONS**

### **A. SURVEY RESULTS INTERPRETATION**

This interpretation focuses on both the primary objectives and secondary objectives of this thesis project. The primary objectives are to investigate if there is a back pain problem in the Navy helicopter community, and if so, the scope, incidence and severity of the problem. The secondary objectives are to provide a means for pilots to express ideas on how to improve HSS and their flight gear, identify potential ways to mitigate the hazards associated with flying rotary-wing aircraft, and identify further research.

#### **1. Back Pain in the Navy Helicopter Community**

The primary objective of investigating if back pain in the Navy helicopter community is occurring has been identified, quantified and scoped, with the result that it is absolutely an issue of concern. When 88.1% of the helicopter pilot community is flying with pain 50% of the time or greater in an environment where 41.9% say the pain is moderately distracting (3 out of 5 scale) or greater and 34.4% admit it is affecting their Situation Awareness is concerning. Considering that the pilot community tends to 'just tough it out,' it is noteworthy that 34.4% recognize and admit that their SA is being affected.

The author asked the same questions about pilots perceptions of co-pilots flying with back pain and 43.2% of pilots stated that the co-pilots SA was affected when the co-pilot had back and/or neck pain during the flight. The difference in the 34.4% for pilots self-critique and the 43.2% for the pilot's critique of their co-pilots can be addressed by the personality profiles of Naval Aviators. It is common knowledge that Aviators have a tendency to believe they can 'handle' issues and fight through pain and are performing because the job is being accomplished. Considering 82% of pilots admit that they would not even go see a flight surgeon until their pain was mildly extreme or greater (4 out of 5 scale) and 63.8% are concerned about 'downing' themselves, this creates a situation

where pilots are waiting until their pain is extreme before seeking medical care. Putting the 'tough guy' helicopter community in poor seating is creating safety hazards in the cockpit and creating chronic health care issues. See Appendix J for pilot feedback about their medical concerns about back pain and flying helicopters for the Navy. Also, see Appendix K for pilot feedback on factors that are influencing back pain.

## **2. Scope, Implications, and Severity**

The DoN does not know how much money is being paid out to aviators who 'tough it out' and then, at the end of their careers, make claims to Veteran's Affairs (VA) about their back problems. The VA does not track retirees based on their previous designators and has not tracked this phenomenon. The Kadix (2010) BCA attempted to analyze the life-cycle costs that the HSS deficiencies are causing for the DoN. This initial analysis estimated that HSS deficiencies are \$10,622,503 per year. However, this cost does not address permanently injured aviators or the cost of VA benefits to retired pilots.

Implications of the HSS deficiencies are adversely affecting the individual pilot's short and long-term health, squadron operations due to 'med down' time and Operational Risk Management (ORM) issues of the pilot, combat readiness, and safety of flight. The HSS deficiencies are affecting combat readiness because 612 pilots ranked long flights (4+ hours) as the second most reason for back pain. Several stories from the open-ended questions about SA show how serious the issue of back pain is becoming in the air. See Appendix L for Summary of Pain affecting SA of Pilots and Appendix M for Summary of Pain affecting SA of Co-pilots.

The scope of this back pain issue is severe. See Appendix N for summary of additional comments as the majority of pilots brought up additional medical concerns. A young, healthy population of aviators is very concerned for their health.

### **3. Pilot Input on Improvements**

The pilots surveyed gave many suggestions to the improvement of the seat design (Appendix O), survival vest (Appendix H), Aircraft controls (Appendix P), and NVG use (Appendix I). The range of suggestions is vast. A sample of the pilots' suggestions are: redesign the survival vest as a modular system so pilots can choose what items to take for the particular flight; redesign the geometry of the flight controls; reengineer the inertia reels for the seatbelts so the belts do not get tangled with the horse-collar on the survival vest; include an inversion table in the Wardroom to relieve back pain after flights; ensure that all commands have the weighted battery packs available for NVG use.

## **B. POTENTIAL WAYS TO MITIGATE HAZARDS**

Back pain in rotary wing aviators is a well-known problem and more needs to be done to alleviate this issue. The DoN invests over one million dollars to train one Naval Aviator and puts them in multi-million dollar helicopters with inadequate seating that is creating chronic pain issues. The problem not only affects the individual pilot but also squadron operations, combat readiness, and safety of flight. It is now well documented that flying with pain is distracting and decreases a pilot's situational awareness.

Addressing the HSS issues will result in healthier aviators, increased combat readiness and operational effectiveness, decreased attrition rates based on chronic pain and injury, decreased time lost from work, increase in squadron operational effectiveness by reducing pilots 'med down' time, and decreased health care costs.

### **1. Flight Posture**

Flight posture needs to be addressed with the HSS to allow the pilot a more natural posture when flying the aircraft. Many pilots have requested bucket style seating similar to race cars. The straight back seating without a waterfall front edge is creating discomfort and compression ischemia.

## **2. Flight Control Geometry**

Flight control geometry needs a redesign of the flight controls so the cyclic is not directly in front of the pilot and the range of the throw of the collective needs to be reduced. The current position of the controls requires the pilot to lean forward and perform “reaching” actions over long periods of time. The placement and throw range of these controls require the pilot to hunch over, with a forward arch of the spine (lumbar kyphosis), to fly the aircraft. This arch of the spine and reaching actions, over time and combined with vibration, causes discomfort and pain. Many pilots with shorter arms cannot adjust their HSS to the full up position and have good visibility because in the event of an emergency their arm length would not allow them to put the collective in the full down position. These anthropometric issues need to be reevaluated in Navy helicopters.

## **3. Reduce Vibration**

Vibration could be reduced if HSS Anti-vibration seat technologies were utilized. Engineer adjustments to the bifilar weights could reduce the vibration where it occurs, in the transmission. A reduction to the transmission vibration would reduce the vibration throughout the airframe. Attenuation of the vibration is particularly important at a frequency of approximately 10-12 Hz, which is the resonant spinal frequency.

## **4. Flight Gear**

Pilots want the weight of the flight gear reduced, redistributed more evenly, and want more control over what gear they take for a particular flight. Appendix H provides their suggestions regarding flight gear.

## **5. Reduce Stigma on Pilots with Back and/or Neck Pain**

Reduce the stigma of pilots going to see the flight surgeon. If pilots were able to see the flight surgeon when they had mild pain, they may be able to save themselves from chronic pain, and the military would save eventual costs on



permanently injured pilots, replacement costs for injured pilots, medical costs, and long-term VA costs. Pilots are concerned about going to see the flight surgeon and if they go, it is normally too late.

## **6. Include Chiropractic Care and Message Therapy for Pilots**

Of the pilots that are receiving chiropractic care, 80.1% state that their pain is reduced. In the open-ended questions, many pilots discussed the lack of availability of chiropractic care within the military medical system and would like to see more availability or be able to use Tricare to see a civilian chiropractor. Many pilots commented on how massage therapy also helps alleviate the pain.

## **7. HSI Perspective – HSS in Acquisitions**

The vibration thresholds for the HSS need to be included as a Key Performance Parameter (KPP) in the DoN acquisition system's Initial Capability Document (ICD) and the Capability Development Document (CDD). The thresholds need to address the length of time that a pilot could be strapped in the seat, not just a two-hour sortie. It is recommended that the more stringent European Standards be utilized because although the seats may cost more, the benefits of retaining healthier aviators far exceed that amount. The Harrer, et al (2009) study recommended:

Crashworthiness and personnel survivability criteria require impact resistance of up to 19 gs. The current seating systems meet crashworthiness standards, but were not designed to attenuate WBV. Improved conformance to anthropometric measurements of pilots poses a concurrent challenge. However, acquisition requirements must strive to meet these concurrent challenges to support increasing demands for mission endurance and accommodate 90% of the general population. Updated criteria for Capability Development Documents (CDDs) and Capability Production Documents (CPDs) with appropriate thresholds (minimum desired performance) and objectives (optimal performance) should be developed. Aircrew system design must consider the need for programmatic support for technology development and testing. Resource sponsors should consider initiating program requirements and budget justification (POM

process) to support Research, Development, Test, and Evaluation (RDT&E) and eventual procurement of best available equipment.

## **C. IDENTIFY AND RECOMMEND FURTHER RESEARCH**

### **1. Enlisted Aircrew Back Pain Survey**

The enlisted aircrew can be strapped into the same seats as the pilots or into troop seats with no padding or lumbar support depending on community. The aircrews are subjected to the same vibration loads of the helicopter as the pilots, but their job duties can vary greatly from the pilot. A study designed specifically for their needs should be done. The author received several requests to do a similar study for the aircrew.

### **2. Data Base to Track Aviators**

A database is needed to track back issues/injuries/pain of aviators as they progress through their careers. A database would provide a means to effectively evaluate life-cycle health and medical costs of pilots. VA should track the number back injuries resulting in benefits through the retired service persons previous designator.

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## APPENDIX A. SURVEY

### Navy Helicopter Back Pain Survey

#### Introduction

As a helicopter pilot myself, I understand the desire to avoid a flight doc due to not wanting to 'down myself.' I've designed and created this survey to gather accurate information for NAVAIR from a pilot's perspective. Due to the distribution design and method of this survey, through the Safety Officers, I do not have access to your names or your e-mail addresses. This survey is completely anonymous so all participants are encouraged to give full disclosure about whether you have back/neck pain or not. Please continue on to the Consent Page to participate in this survey.

### Navy Helicopter Back Pain Survey

#### Consent

Consent to Participate in Anonymous Survey

You are invited to participate in a research study entitled Helicopter Vibration and the Scope of Back Pain in Navy Helicopter Pilots. The objectives of this survey are to identify whether back/neck pain is an area of concern with pilots in the helicopter community and to determine the scope and implications of the back/neck pain problem. Potential benefits to NAVAIR are to provide statistical data to assist the helicopter community in getting better seating in the helicopters and/or R&D funds for further research in anti-vibration seat technologies.

This survey should take about 15 minutes to complete. Your participation is voluntary. If you participate, you are free to skip any questions or stop participating at anytime without penalty. Your responses are anonymous. Results of the survey will be used responsibly and protected against release to unauthorized persons; however, even with such safeguards in place, there remains some risk, however small, of a data breach.

If you have questions regarding the research, contact LT Andrea Phillips at [asphilli@nps.edu](mailto:asphilli@nps.edu), 831-747-7652. If you have any questions regarding your rights as a research subject, please contact the Naval Postgraduate School IRB Chair, CAPT John Schmidt, [jkschmid@nps.edu](mailto:jkschmid@nps.edu), 831-656-3864.

**1. Click 'Yes' to continue to the survey.**

☐ Yes

☐ No, Thank you

If No, then survey goes to the end - Thank you page

#### Aviator

**2. Are you a Winged Navy Helicopter Pilot?**

☐ Yes

☐ No

If No, then survey goes to the end - Thank you page

## Demographics

3. What is your gender?

☐ Male

☐ Female

4. What is your height (in inches)?

inches

5. What is your weight (in pounds)?

lbs

6. How many years have you flown for the Navy?

years

## Flight Hour Info

7. Estimate your total flight hours.

Total

8. Estimate how many flight hours you have in single engine helicopter?

Single engine helo

9. Estimate how many flight hours you have in multi-engine helicopter?

Multi engine helo

10. Estimate how many flight hours you have in multi-engine fixed-wing airplane?

Multi engine fixed-wing

11. In what type of helicopter do you have the most flight hours?

	H-46	H-53	TH-57	H-60
Most flight hours	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Anthropometrics

12. In flight school, were you disqualified from flying any aircraft due to anthropometric measurements (body measurements such as arm length, sitting height, leg lengths...etc)

☐ Yes

☐ No

☐ I do not remember

If No, then to question 14



## Anthropometrics II

13. Which aircraft were you disqualified from and due to which anthropometric measure?

	arm length	sitting height	knee to buttocks length	overall height	I don't know
E-2/C-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EA-6B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F-18	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C-130	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H-53	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H-60	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Seat Adjustment

14. Are you able to adjust your seat well enough that when your harness is locked you can still reach all required switches, bottom out the collective if needed in an emergency, and see well over the cockpit dash?

	Yes	No
reach all the switches	<input type="radio"/>	<input type="radio"/>
bottom out the collective	<input type="radio"/>	<input type="radio"/>
see well over the dash	<input type="radio"/>	<input type="radio"/>

## Seat Adjustment II

15. What concerns/issues are you having with adjusting your seat? (Check all that apply)

	Arm length	Cyclic gets in the way	Trouble reaching all the switches	Can't bottom the collective and see well over the dash	Other/None
Height adjustment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fore & aft adjustment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

16. Please describe any concerns/issues you are having with adjusting the seat.

## Seat Cushions

**17. What is the condition of the seat cushions in your primary platform aircraft? (Check all that apply)**

- ☐ Padding is too thin
- ☐ Lumbar support insufficient
- ☐ Air bladder doesn't stay inflated
- ☐ Lumbar support is satisfactory
- ☐ Padding is satisfactory
- ☐ Air bladder system works
- ☐ Other

**18. Have you ever used a supplemental seat cushion in the aircraft?**

- ☐ Yes
- ☐ No

If No, then to question 20

## Seat Cushion II

**19. Did the supplemental seat cushion help alleviate any back and/or neck pain?**

- ☐ Yes
- ☐ No

## Back Injury

**20. Have you had any back injuries NOT related to flying?**

- ☐ Yes
- ☐ No

If No, then to question 22

## Back Injury Explanation

**21. Please explain your back injury not related to flying.**

## Experienced Back Pain

**22. Have you ever experienced back and/or neck pain during or immediately following a flight?**

☐ Yes

☐ No

If No, then to question 33

## Back Pain I

**23. During the flight when the back pain occurred, did you perform any maneuvers in the aircraft that were out of the ordinary?**

☐ Yes

☐ No

**24. During the flight when the back pain occurred, what type of gear were you wearing? (Check all that apply)**

☐ Standard vest with horse collar

☐ Standard vest without horse collar

☐ Desert vest with body armor

☐ NVGs

**25. What area of your back did you experience pain? (Check all that apply)**

☐ Lower Back

☐ Middle Back

☐ Upper Back

☐ Neck Pain

## Back Pain II

26. Any other comments or observations about back and/or neck pain and factors that influence it?

27. Approximate flight hours when back and/or neck pain started?

28. In which type of flight profile does the back and/or neck pain occur? (Check all that apply)

	Tactical Profile	NVG use	Shipboard Ops	2 hr flights	4+ hr flights	VFR	Instrument	Other	N/A
Back Pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Neck Pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Pain Frequency

29. How often do you have back and/or neck pain during or immediately after a flight? (1=Rarely, 5=Very Often)

	Rarely 1	Infrequently 2	Sometimes (50%) 3	Often 4	Very Often 5
Back Pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Neck Pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Distraction

30. How distracting was the back and/or neck pain during your flight? (1=Not very distracting, 5=Very distracting )

	Not Very Distracting 1	Mildly Distracting 2	Moderately Distracting 3	Distracting 4	Very Distracting 5
Back Pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Neck Pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

31. Did the back and/or neck pain affect your Situational Awareness during the flight?

☐ Yes

☐ No

32. Please describe how the back and/or neck pain affected your SA.

## Distraction II

33. Have you ever flown with a co-pilot who was flying with back and/or neck pain?

- ☐ Yes
- ☐ No
- ☐ I don't know

If No, then to question 37

## Distraction III

34. How distracted was the co-pilot who was experiencing back and/or neck pain during the flight? (1=Not very distracted, 5=Very distracted )

	Not Very Distracted 1	Mildly Distracted 2	Moderately Distracted 3	Distracted 4	Very Distracted 5	N/A
Back Pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Neck Pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

35. Did the back and/or neck pain affect the co-pilots Situational Awareness during the flight?

- ☐ Yes
- ☐ No

36. Please describe how the back and/or neck pain was affecting the co-pilots SA.

## Rankings

37. Please rank the following items as to their contribution to back and/or neck pain. (1=Biggest Reason for pain and 10=least reason for pain)

Flight posture "helo hunch"	<input type="text"/>
Hard landings	<input type="text"/>
Tactical landings	<input type="text"/>
NVG use	<input type="text"/>
Shipboard landings	<input type="text"/>
Long flight (4+ hours)	<input type="text"/>
Aircraft Vibrations	<input type="text"/>
Body Armor	<input type="text"/>
Seat/Cockpit ergonomics	<input type="text"/>
Flight Survival Vest	<input type="text"/>

## Flight Surgeon

38. Would you be concerned about 'downing' yourself if you went to see the flight surgeon about back and/or neck pain?

- ☐ Yes  
☐ No

39. How extreme would the back and/or neck pain have to become before you would see a flight surgeon? (1=Mild, 5=Extreme)

	Mild 1	More than Mild 2	Moderate 3	Mildly Extreme 4	Extreme 5
Back	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Neck	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Military Medical

40. Have you ever seen a flight surgeon or military medical doctor for **BACK** pain related to flying?

- ☐ Yes  
☐ No

41. Have you ever seen a flight surgeon or military medical doctor for **NECK** pain related to flying?

- ☐ Yes  
☐ No

## Military Medical II

42. Have you ever been 'downed' for back and/or neck pain?

- ☐ Yes for back pain  
☐ Yes for neck pain  
☐ Yes for back and neck pain  
☐ No

43. Has a flight surgeon prescribed medication for back and/or neck pain occurring as a result of flying?

- ☐ Yes  
☐ No



## Civilian Medical

**44. Have you ever seen a doctor outside of the military because you didn't want to 'down yourself' for back and/or neck pain?**

- ☐ Yes  
☐ No

## Over the Counter

**45. Do you use over-the-counter pain relievers for back and/or neck pain?**

- ☐ Yes  
☐ No

## Chiropractor

**46. Have you ever seen a chiropractor for back and/or neck pain? (Check all that apply)**

- ☐ Yes-through a military facility  
☐ Yes-through a civilian facility  
☐ No

If No, then to question 48

## Chiropractor II

**47. After your visit with a chiropractic care provider, did you see results with a reduction in your back and/or neck pain?**

- ☐ Yes, my pain was reduced after chiropractic care  
☐ No, my pain was not reduced after chiropractic care

## Legs

**48. Have you ever experienced numbness or loss of feeling in your legs and/or feet during or immediately following a flight?**

- ☐ Yes  
☐ No

**49. Please explain the situation when you experienced the numbness or loss of feeling in your legs and/or feet?**

## Open ended Questions

50. Do you have any medical concerns regarding your back and/or neck as a result of flying helicopters?

51. Do you have any comments about seat design which you believe contribute to back and/or neck pain?

52. Do you have any suggestions that could improve the survival vest?

53. Could aircraft controls or gauge positions be a reason for back and/or neck pain?  
Please explain

54. In your opinion, do you feel that NVGs contribute to back and/or neck pain?

55. Is there anything you would like to tell us related to back and/or neck pain in relation to flying?

## Thank you

Thank you for participating in this survey. NAVAIR, NPS and I appreciate your time and effort. Fly safe. V/R LT Andi Phillips



## **APPENDIX B. REQUEST FOR VOLUNTEERS TO COMMODORES**

To: HSMWINGPAC/HSCWINGPAC/HSMWINGLANT/HSMWINGLANT Commodores  
From: Andrea Phillips, LT, NPS

Subj: EXECUTIVE SUMMARY OF THESIS AND REQUEST TO CONDUCT A SURVEY

The 'helo hunch' is a term used by helicopter pilots to make light of the phenomenon of back pain that occurs in the helicopter pilot community. This thesis will investigate issues such as long hours in the cockpit, ineffective seat padding, Night Vision Goggle (NVG) use, and the constant vibration involved in flying rotary wing aircraft. Pain is subjective and severity is difficult to compare between individuals. Does back pain affect safety of flight? Frymoyer and Cats-Baril (1991) reported that in the civilian community, at any given time 15 to 20 percent of people are suffering from back pain. In the military helicopter aviator community, the prevalence is four times that (Sargent & Bachmann, 2010). The Sargent and Bachmann article was written by flight surgeons suggesting that back pain is an issue in the helicopter community. The article also suggests that back pain may be affecting safety of flight but did not have any data to back up this claim.

This thesis will provide an analysis of the scope, incidence and severity of back pain in the helicopter community through semi-structured interviews of pilots and flight surgeons and a survey of the MH-60 community. The results will provide NAVAIR with descriptive statistical analysis from the survey which will provide the information they desire to decide whether it is cost effective to invest R&D funds in anti-vibration seat technology and whether flight safety may be affected, in the opinion of Navy helicopter pilots.

As a MH-60S helicopter pilot and a Naval Postgraduate School (NPS) student in the Human Systems Integration (HSI) program at the Graduate School of Operational and Information Sciences (GSOIS), I am respectfully requesting permission to conduct my thesis survey throughout the MH-60 communities. There was a Business Case Analysis (BCA) for the Improved Navy Helicopter Seat System performed by a company called Kadix Systems, NAVAIR has requested that I address some gaps in the information that was provided in the BCA as well as be interested in a pilots perspective.

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LT Phillips

Your thesis project on helicopter back pain will be beneficial to the Crashworthy Systems branch and department. NAWCAD/NAVAIR has on-going efforts related to crashworthiness, aircrew endurance, and reduction of back injury/strain, and your project is an important compliment to these efforts.

vr,

Keith L. King

Crashworthy Systems Branch Head

Naval Air Systems Command (AIR 4.6.7.2)

48110 Shaw Road BLDG 2187

Patuxent River, MD 20670

COM (301) 342-8443 FAX (301) 757-1803

keith.king@navy.mil

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## **APPENDIX C. REQUEST FOR VOLUNTEERS TO COMMANDING OFFICERS AND SAFETY OFFICERS**

To: HSCWINGLANT Commanding Officers and Safety Officers,

The HSCWINGLANT Commodore has agreed to allow me to conduct a survey on behalf of NAVAIR and the Naval Postgraduate School about the scope of back pain in the helicopter community and seat design. This survey/thesis project is designed to assist Mr. Keith King from the Crashworthy Systems Branch Head at NAVAIR. Please see the attached memo that Deputy Commodore Esposito signed.

As a helicopter pilot myself, I've designed and created this survey to gather accurate information for NAVAIR from a pilot's perspective. Due to the distribution design and method of this survey, I will not have access to names or e-mail addresses. This survey will be completely anonymous so all participants will be encouraged to give full disclosure about whether you have back/neck pain or not.

I will need some assistance with the distribution of the survey to ensure the complete anonymity of the pilots. The survey will be available to access via web-link from an e-mail from me on Monday, March 7<sup>th</sup>. Please have your Safety Officer (or whomever you designate) forward the e-mail to your 'All Pilot' distribution list within your squadron. After the e-mail is forwarded please have the Safety Officer simply send me an e-mail stating it was forwarded and the number of pilots in your squadron. The number of pilots in your squadron is needed for statistical analysis. Please inform your pilots that the survey is coming at your next AOM and encourage them to participate by completing the survey. The survey is designed to give NAVAIR a pilot's perspective and assist them in making our health better.

Thank you in advanced for your assistance and hopefully this project will assist NAVAIR with the data they need to get the funding to redesign our seats. I've also attached an Executive Summary of the thesis for further information. Please don't hesitate to call me 831-747-7652 or e-mail me at [asphilli@nps.edu](mailto:asphilli@nps.edu) if you have any questions or concerns.

V/R  
LT Andi Phillips

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## **APPENDIX D. REQUEST FOR VOLUNTEERS**

Recruitment E-mail:

As a MH-60S helicopter pilot and a student at the Naval Postgraduate School (NPS) in the Human Systems Integration (HSI) program, I am requesting Navy helicopter pilots to voluntarily participate in the survey linked below for this thesis project being conducted for NAVAIR. This is an anonymous survey.

The objectives of this thesis/survey are to identify whether back pain is an area of concern with pilots in the helicopter community and to determine the scope and implications of the back pain problem in the helicopter community.

The results of this survey will provide an analysis of the scope, incidence and severity of back and/or neck pain in the helicopter community for the Crash Worthy Branch of NAVAIR. This descriptive statistical data will provide information on whether it is cost effective to invest R&D funds in anti-vibration seat technology and whether flight safety may be affected from a pilot's perspective. Depending on the results, the statistics will be used to help the helicopter community get better seating in the helicopters, research anti-vibration seat technologies, and other methods to mitigate the constant vibration hazards associated with flying rotary-wing aircraft.

The major benefit to the NAVAIR is statistical data on back pain and/or neck pain and injury of helicopter pilots. Due to the design and distribution method of this survey, through the Safety Officers, I do not have access to your names or your e-mail addresses. This survey is completely anonymous so all are encouraged to give full disclosure about whether you have back and/or neck pain or not.

Thank you in advance for your time and assistance in this research project. Fly Safe! Any questions or concerns, please contact me at [asphilli@nps.edu](mailto:asphilli@nps.edu) or 831-747-7652.

V/R  
LT Andi Phillips

Please click on this link below for the survey:

[https://www.surveymonkey.com/s/Navy\\_Helicopter\\_Back\\_Pain\\_Survey](https://www.surveymonkey.com/s/Navy_Helicopter_Back_Pain_Survey)

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## APPENDIX E. INFORMED CONSENT

You are invited to participate in a research study entitled *Helicopter Vibration and the Scope of Back Pain in Navy Helicopter Pilots*. The objectives of this survey are to identify whether back pain is an area of concern with pilots in the helicopter community and to determine the scope and implications of the back pain problem. Potential benefits to NAVAIR are to provide statistical data to assist the helicopter community to getting better seating in the helicopters and/or R&D funds for further research in anti-vibration seat technologies.

This survey should take about *15 minutes* to complete. Your participation is voluntary. If you participate, you are free to skip any questions or stop participating at anytime without penalty. Your responses are anonymous. Results of the survey will be used responsibly and protected against release to unauthorized persons; however, even with such safeguards in place, there remains some risk, however small, of a data breach.

If you have questions regarding the research, contact LT Andrea Phillips at [asphilli@nps.edu](mailto:asphilli@nps.edu), 831-747-7652. If you have any questions regarding your rights as a research subject, please contact the Naval Postgraduate School IRB Chair, CAPT John Schmidt, [jkschmid@nps.edu](mailto:jkschmid@nps.edu), 831-656-3864.

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## APPENDIX F. SUMMARY OF LOSS OF FEELING IN LEGS AND/OR FEET

From question 49 of the survey, “Please explain the situation when you experienced the numbness or loss of feeling in your legs and/or feet”, the following appendix was created. The comments were slightly edited for typographical errors and misspellings. Comments were selected if feedback could be beneficial for NAVAIR engineers and/or decision makers of the NAVAIR Community.

10 hour VR flights are the norm, flat seat pans and no cushions are horrible. The Aircrew in the back are worse off - their seats are stadium seats.
12 hours in bird. knees hurt and legs were a little bit asleep
3+ hour bags from sitting/hunching. pins and needles/numbness feeling quickly subsided after walking around and stretching
6-9 hour vertrep evolutions, often resulted in soreness in legs and butt.
8.5 hour ship DLQ hop as HAC
After a 5 hr flight I had some tingling in the feet.
After a 6.2 hour flight, with body armor on, NVDs, and a long MEDEVAC in Iraq, by the time we got back, the entire crew was exhausted (6 in the morning...just as the sun was peeking over the horizon), as I came out of the cockpit, I noticed my feet were asleep and felt tingling in my legs. Only took a minute or so to get them back when I started walking, but I did feel weak in he knees. Probably blood flow.
after a long flight in an H60H
after a long flight with multiple shipboard landings
after a long, stress full flight. Toes get numb from the seat hitting the back of my thighs
After a standard flight, nerve pain.
After an NVG flight, pulling into the line and hitting the brakes, I felt a stabbing pain in my lower back, and was unable to get out of the aircraft for several minutes. The next day, I was unable to get out of bed for several hours.
After any long flight, stiff back and pain from back going down legs is normal.
After conducting multi bag flights with over 6 hours of flight time and poor cushions, the back pain in the lower back with the inability to really stretch increased the pain to numbness.
After extended flight, I occasionally experience numbness in the upper back part of my legs.
After extremely long flights (>8 hrs) I have experienced numbness in my legs due to having remained in a seated position for such a long time.
After extremely long flights, (5+ hours) I've experienced tingling or numbness in my fingers and toes. It's always gone away quickly after the flight is over.
After longer flights, more than 3 hours, I would have to adjust about every 10 minutes because of the pain and then the lack of feeling in my legs.
after most flights my right leg is numb
after some flights, I felt tingling down the front of my thigh
Any flights over 3-4 hours I usually experience numbness in my feet.

Anytime I fly longer than 4hrs I will have numbness or loss of feeling in my feet.
Armor seats.
could not feel my right leg after a long day of FCF. All day ground turns with a 3.0 hour flight.
Cross country flight. 5+ hours. Legs started to get uncomfortable and tingle as time progressed.
Depending on which seat I sit in, my outboard foot will tingle unless I stretch it during flight.
Due to my herniated disc (from flying), the bottom, forward part of my right foot is constantly numb, as is the outside of my right calf.
Due to the narrowness of the seat in the '60, the edges of the seat pan dig into the sides of my legs and restrict blood flow.
During 4+ hours of plane guard my legs began to tingle and lose feeling.
During a double bag, I felt numbness in my feet at the end of the flight. This became more of a problem throughout deployment.
During deployments or periods which required long periods in the aircraft, I often get a bruised feeling in my butt. At times, that leads to tingling in my feet.
During every flight.
During extended operational flying where the crew becomes orientated on the mission, it can be hard to take a break and adjust positioning and posture in the aircraft. After staying in a single uncomfortable posture for an extended period of time, numbness starts at the trunk and extends downwards into the legs resulting in loss of SA as the issue becomes more problematic.
During flight sometime my feet will go numb
During long flights (greater than 3 hours), a tingling sensation will develop from the lower back down and will remain for some time until after the flight.
During long flights (PMC and Gator SAR). The seat cuts off circulation to my legs. Once it starts, I'm never comfortable until I get out of the helo and walk / stretch.
Early days of MH-60S during prolonged (4+ flight hour) instructing students due to poor seat cushions. Numerous HAZREPs written. Brought in personal seat cushion to alleviate until it was banned by NAVAIR.
Experienced an episode of sciatica in which my right leg would experience pain and numbness.
Experienced it a couple times on deployment. Primarily in my toes.
extended flight (+6 hrs); general numbness like my feet had fallen asleep.
Extended flights or back to back flights. Mainly joint pain.
FCF- 7+ hours in the aircraft
FCF days when I am in the cockpit for more than 4 hours, or flights that last more than 3 hours, and my feet and buttocks will be numb immediately upon exiting the aircraft.
Feel numbness in upper thighs (primarily left leg) after every flight. The longer the flight, the more extreme the numbness. Worse after 4+ hour bags.
Felt asleep
Flying for 3+ hours with a seat cushion that will not inflate or stay inflated. The new seat cushion that blows up and has the wooly top is very comfortable. It also sucks that the cushion does not "self inflate" and must be manually blown up before each flight.
Flying for 3+ hours.
Flying near Korea - the temps were approx 45 degrees, 4+ hour flight and I loss the feeling in my feet and my knees. It was as if both of my legs 'fell asleep'. After

shutdown at the boat, I almost fell down when I got out of the aircraft.
General numbness for several steps after getting out of the helo
Hips were out of alignment, pressing on the nerves. Chiropractor visits remedied this issue.
I can't say that I've ever experienced "numbness" or "loss of feeling" (which I'd attribute to nerve issues), though on many occasions I've stumbled for the first 10 yards walking from helo to hangar because my legs and back have sort of 'frozen' in position.
I do not believe it was from neck/back pain but from either airsickness or white-knuckling the stick/cyclic due to nervousness.
I don't feel numbness, but I feel a dull pain through the top of my thighs and my lower back.
I experienced loss of feeling in my left leg and foot. To this day (2 years later) I still have no feeling in my left leg or foot. I came back from the boat on a Monday with some back pain radiating down my leg. By Friday I couldn't feel my leg anymore and was in extreme pain. (the best part was that medical took a whopping 14 weeks to finally let me out in town to see a surgeon...the surgeon informed me that had I had surgery right away, I may have retained feeling in my leg)
I feel a stinging sensation (pinched nerve) in my buttocks going down through my leg to the middle calf after some flights, esp. the ones longer than 3.5 hours. Usually takes a few hours to "walk it off."
I flew plane guard for 8 hours and was in the seat for 12 hours in the H60 and I could barley move when we finally finished.
I had some numbness after a flight if I was standing in certain positions for long periods (at attention).
I have experienced numbness and tingling in my feet after prolonged flight. I am able to get rid of it by shift around and adjust myself in the seat.
I have experienced numbness in my legs due to a loss of circulation in my lower extremities. Better seat cushioning would alleviate this problem; it is not nerve or vibration-related.
I have felt pain in my knees
I have numbness and tingling down my left arm and occasionally my right arm. On occasion I have tingling down the outsides of both legs down to the outsides of my feet.
I routinely feel numbness and tingling in my legs. It first started after flights but now will happen if I stand for to long.
I routinely get tingling down my left leg
I usually get numbness and loss of feeling in my left thigh towards the end of every flight.
I usually have to stretch my back and "pop" it a few times before my senses return to 100%
If I fly for more than 3 hours without getting out of the chair and am mostly on the controls (by that I mean not moving around and mostly feet on the pedals) both of my feet will start to tingle and feel numb. This happens pretty much every flight over 3 hours where I am mostly on the controls and not moving around as much as I do when off the controls.
In 2001 I had bad sciatica. After my surgery, I no longer have sciatica, but I do have stiffness.
In the seat too long, the seats suck and my legs got stiff, and sore, went numb.
Inability to stretch legs out leads to routine pain during flights

It usually happens on extremely long flights, 4+ hours, and more often in the HH-60H, due to the Kevlar seat design with no real cushioning. your legs kind of "Fall asleep" which would be a real factor if there was a BOOST OFF malfunction.
It was a fairly extreme me situation and we were performing multiple sorties and were strapped into the cockpit for 8-12 hours for several days in a row.
It was a long flight, +4 hours, and never had the opportunity to stretch. Even after taking Motrin for the initial pain I had numbness on my leg.
its fairly common when the seat cushion does not inflate. no specific circumstances, but typically during boring portions of the flight, for example, in "the D," where you aren't moving around much in the cockpit. Basically, if you sit still, your leg is guaranteed to fall asleep based on the seats we have
Left leg numbness became a regular part of flying while instructing in the FRS where flights were consistent and over 4 hours each day.
left sciatic nerve pinched and left leg and foot numb after long flights in the 46 and 57. went away when I started using supplemental seat cushions.
LEGS FELL ASLEEP AFTER DOUBLE BAGS, REQUIRING ME TO SIT AT SIDE OF AIRCRAFT UNTIL CIRCULATION WAS RESTORED. I HAVE ALSO HAD LEFT ARM NUMBNESS DURING AND AFTER FLIGHTS DUE TO EXTENDED FLIGHTS
legs were numb from the thigh to upper shin from sitting
Logged 9 hours of flight time on a 18 hour crew day, and had a hard time walking the next day my leg hurt so much from the back pain.
Long (4+ hours) flight where butt and legs got numb from sitting in one position for a long time.
Long 4+ hour flights in full body armor sitting on a Kevlar seat with little cushioning.
long duration flights
long flight, cushions too thin, NVGs,
Long flight, had feeling of legs "falling asleep"
Long flight, leg can begin to fall asleep
long flight, old seat cushions.
long flight, tingling legs and feet, constantly had to re-adjust
Long flight. Just like flying commercial, have to keep your legs moving to avoid.
long flights
Long flights (10-12 hours) with minimal getting out and walking around.
long flights, 4+ hours, I will start to feel tingling and loss of sensation in my feet
Long flights, in both the 60H and the 60F, where the padding in the seats was really poor. That's a big factor in what made me go buy my own seat cushion, as the seat cushions in the aircraft are very, very poor.
Long flights, usually greater than 4 hours. Typically starts with leg numbness in the aircraft around the 3rd hour of flight. If I'm unable to figure out ways to mitigate the pain, the worst back pain symptoms usually come the morning after a long flight event.
Loss of feeling in feet after long flight in HH-60H
Mainly in HH-60H aircraft after long flights. There just isn't enough leg room.
Mild numbness. I associate with not being able to stand up or move around for 4ish hours when strapping into an H-60 for a mission and so having reduced blood flow to my legs during that period of time.
Mild tingling in right left after 4.0 hour missions, sometimes with deck landing training I will have been seated in the aircraft for upwards of 8 hrs.
Mostly experienced in my knees.
My butt and thighs feel slightly numb/ slightly pained about 1.5-2 hours into a flight. To

combat this feeling requires adjusting my seating position approximately every 15 minutes to get about 10 minutes of relief.
My butt goes numb fairly often in the -60H. The seat is essentially a flat piece of Kevlar with a pad on top that has been squashed down over the years until it's about a half in thick.
My feet were a little numb towards the end of the flight on several longer duration flights.
My feet were just tingly, like they were asleep.
My groin area really hurts after 3+ hour flight in HH-60H and old seats in SH-60F.
My knees come above my mid-body frame while sitting in my aircraft, causing my legs to fall asleep after long flights (+3 hours)
my left buttock had numbness almost every day while I was flying, and often when I was not/am not flying
my lower back hurts as well as pain on the bone right in the middle of my glutes. I think its the lower part of the pelvic girdle. Having you feet up on the pedals puts all the pressure on your glutes and it grinds those bones into the seat.
Normally after a long flight (4+ hours) my legs can be numb when I get out of the cockpit making standing or the first few steps difficult.
Numbness all the time, doesn't have to be a long flight.
numbness in butt and upper thigh after long flight
Numbness in feet
Numbness in feet/lower extremities experienced after long (4+ hours) flights. Particularly pronounced on aircraft with substantial flight hours where seat cushions no longer function properly.
Numbness in legs after a long flight.
Occurs on long flights over 3 hours.
Often times I feel numbness in upper leg area and lower back immediately and sometimes during long flights >3 hours
on 7 hour flights your legs tend to get restless
On a few 5+ hour flights in which there were long transits between landings, my legs started to fall asleep. The only way to get the blood flowing again was to lower the seat all the way, unbuckle myself, and stand up into a squatting position.
On long flights (4+ hours) my legs can get a little numb. If the padding on the lip of the seat is thin then my legs get numb but if it isn't then I'm fine.
On long flights I often have one or both feet fall asleep.
On rare occasions I have had tingling in my legs during longer flights.
On really long flights (6+ hours) I have had some leg numbness.
On several occasions, after flying for only an hour or so, my lower back will be very sore, and my left leg will become numb/tingly. The numbness/tingling persists for usually 3 hours after the flight is over.
Over 2 hour flights with improper seat cushioning
Pretty much a regular occurrence.
Pretty sure it was from the way I was positioned in the seat. My left leg went numb due to a lack of blood flow. Feeling went away when I repositioned myself. Vibrations felt through the pedals also have made my feet numb
Primarily loss of feeling in legs during flight. Padding in seat insufficient to relieve point pressure on thighs. Blood flow stops at the harness leg straps and just above the knees (edge of seat).
Randomly occurs

Rarely after a long flight, I experience numbness in my lower legs when climbing out of the cockpit.
Right leg can become a bit numb/tingly after long flight 3.0+
Seat ergonomics and seat cushion/lumbar support
Sitting for long periods of time (flying) on a less than sufficiently padded seat combined (major cause) combined with sitting on leg straps of survival vest tends to cut off circulation to my legs, sometimes making them go numb.
Sitting through a triple bag at sea it was hard to walk after the flight. 9+ hours in the aircraft is painful.
Some particularly long flights are tough on the legs. I try to move the pedals forward to stretch from time to time to try and help.
Sometimes after long flights
Sometimes I feel numbness in my legs after flying.
Straps on survival harness was cutting circulation from being fitted too tight.
The flight was 5+ hours of SAR duty and the seat cushion was useless and butt right on the Kevlar was painful and put my legs to sleep. I stood in my seat to relieve the pain.
The lack of support or cushion and the flight vest gear can sometimes make your arm or legs go numb or cramp up.
The seat bottom is very uncomfortable, and therefore it cuts off circulation to the legs. I've never had a problem manipulating the controls, but after an hour, I have to continually try to stretch out legs.
This happens on almost every flight after about two hours.
Tingling and numbness down the back of my right leg.
Tingling in leg due to survival vest straps
Toes became a little numb
Triple bag, numbness from quads to my toes from a pinching feeling of the edge of the seat just up under/behind my knees.
Typically this will occur on long flights (6+hours) when you don't get out of the seat.
Usually as a result of sitting on a portion of the flight vest, bunched seat cushion or dry suit.
Usually my foot on the inside of the cockpit, so in the left seat my right foot, in the right seat my left foot. The foot/leg I can't stretch out or move really in flight.
Very long flight 5+ hours
Very long flights, tied to sciatic nerve pain
Very tight feeling at the back of both legs after a 3+ hour flight happens fairly often.
Vest/Harness strap cut circulation to leg while flying a long flight. The strap ran under my thigh.
When I slipped my disc during Shore duty I was down and had numbness in my leg for about a year
When sitting in the same position for an extended period of time, I would get pins and needles in my feet and legs. I presume this was due to the bottom of the seat cushion and extended flight time.
whenever I have a good deal of back pain.
While at the controls, needed to adjust seat and pedal placement
Yes, but this was definitely more a factor of sitting in the A/C for so long that my butt was just numb and falling asleep
your legs can go to sleep if you overinflate the seat pan air cushion or don't adjust your position regularly

## APPENDIX G. SUMMARY OF HSS ADJUSTMENT ISSUES

From question 16 of the survey, "Please describe any concerns/issues you are having with adjusting the seat" the following appendix was created. The comments were slightly edited for typographical errors and misspellings. Comments were selected if feedback could be beneficial for NAVAIR engineers and/or decision makers of the NAVAIR Community.

1) Can bottom the collective with harness locked, but must lean slightly left to do so. 2) cannot reach backup instruments without unlocking harness. 3) with seat adjusted forward, after cyclic bumps seat pad.
Actually believe the seat is TOO CLOSE to the dash and wish it would slide aft more than it does.
adjusting the seat aft so that I can stretch my legs
Adjusting the seat higher allows for better visual reference when conducting approaches especially no-hover LZ landings, but also requires me to lean to the left to bottom the collective
Also pedals feel are close causing my knees to be bent and high. Plus there is no room to stretch them out when not at the controls.
As a flight instructor I now sit lower in order to better have control over the flight controls. I have a better scan now than when I first started and will sacrifice seeing directly in front of me.
At 5'5", I cannot adjust my seat all the way up to see well over the dash, because my arm is not long enough to bottom the collective in an emergency. I have to click my seat down, which restricts my view over the dash especially in nose up attitudes.
Based on NATOPS, the seat should be adjusted as high up as practical in order to provide max crash worthy stroking performance but this would not allow me to bottom out the collective if adjusted that far
Being 77 inches tall I cannot move the seat far enough back or lower the seat enough in order to sit comfortably in the aircraft. The aircraft is designed for average height and smaller but not average height and larger.
Biggest concern is being able to keep a good sight picture and see all lights on the caution panel
Cannot make fore & aft adjustments in flight because collective at mid-position gets in the way. (MH-60S)
Can't adjust the seat back far enough. My knees are almost hitting the dash and I cannot straighten my legs in flight.
Can't comfortably bottom out collective with seat height adjusted high enough to see over the dash, especially boost off. With seat locked, can't reach switches on other side of cockpit or forward of RADALT button.
Can't move it far back enough.

Can't reach all the switches without unstrapping. Can see over the dash ok and bottom the collective, but it is uncomfortable to bottom the collective. (Have to constantly lean to the left to do it.)
concerned about the forward and down stroking seats in the 60 that have had a history of impaling us on the cyclic in a crash. site out of the 60 is also bad. you have to have the seat all the way up to see over the dash but that makes it hard to bottom the collective and contorts your back.
Copilot seat is too close to instrument panel even when slid to furthest aft position in block 3b models of the H-60S
Cyclic always touches my legs in full range of motion, would be nice if seat moved back farther.
Cyclic in H-60 sits very far back, forcing uncomfortable right arm position.
Cyclic only gets in the way when body armor is used in conjunction with survival vest
During flight control checks on the ground in both the H-53 and H-60 the cyclic can contact either or both pilots.
Enough clearance for knees.
Especially in the H there is not enough room to fully deflect the cyclic to the right due to the HCU in the left seat
Especially in the left seat, the cyclic hits my legs/stomach in the extreme positions. Its not an issue other than in control checks before the rotors are engaged.
Even fully extended my legs are bent a good amount. Foot rest like 53 would be nice too.
Even though I have relatively long arms, to bottom out the collective and see over the dash, it requires me to be slightly hunched forward and long flights produce a sore back and compressed vertebrae at times
Fore & Aft adjustment: With the seat in the full aft position my knees hit the dash. At times it restricts my ability to input right pedal when in the left seat. I have to adjust where my knee is at to give the desired input.
fore aft in HH60 just does not go far enough aft. when flying with "larger" copilots, cyclic hits buckle release. when doing max left cyclic, usually contacts every copilots left leg.
Fore and Aft Adjustment is tricky with long legs. Even while adjusting pedals, sometimes have my knees in my chest while needing to keep seat position for arm length
Fore and aft adjustment...In the left seat, with the seat all the way back, my shins hit the bottom of the flight display panel. I have to push all of the air out of the backrest to get enough clearance. This also happens in the new MH-60S Block IIIB in the right seat.
Fore and aft: I am a big guy (tall, long arms/legs, etc.) I wish I could slide the seat aft more. Feels cramped sometimes
Fore and Aft: would like to extend legs further
Fore/aft adjustment limited. Often knees and shins contact the bottom of the glare shield since seat cannot be pushed aft far enough.



Fore/aft, I need more legroom than the H-60 provides, need to be able to move the pedals farther fwd or seat farther aft, but that's a knee arthritis issue, not back.
From the left seat I cannot reach the transponder when locked. From the right seat I cannot reach copilot circuit breaker panel without taking off my restraint harness.
Generally I have found that the ideal height of the 60S for switch/control manipulation tends to be about 2-3 inches lower than the ideal height for sight picture over the dashboard. I think that while this is a minor annoyance during the day, and a significant annoyance at night, it greatly improves the instrument flight capabilities to the aircraft. This opinion is based mostly off of picking up aircraft from the Sikorsky plant and having the opportunity to sit in the seat and compare the 60S cockpit vice the Army 60M cockpit, and is due mainly to the slightly larger size of the 60S dashboard vice the 60M dashboard. This plays into seat adjustment because the height that would be required for ideal sight picture is limited in vertical travel for me more by the cockpit cabin / upper windshield frame - while for control manipulation ideal location is limited by arm length/physiology.
Glare shield blocks the master caution in some aircraft when the seat is adjusted high enough to see well over the dash.
Glare shield excessively high and visually restrictive; could be modified to provide better visibility for all pilots
H60 glare shield blocks the master caution panel. I would sit with the seat higher (and still be able to reach all switches and manipulate controls) but I have to adjust the seat lower than desired so I can still see the master caution panel.
H-60F/H/S qualified pilot - I've had more problems in the H-60S due to the larger glare shield and dash. Cyclic positioning and movement is restricted especially when you start including body armor and weapons. Body armor changes fore/aft positioning, cyclic gets in the way more, and I've experienced a lot more back pain when flying in body armor. Especially on long missions (3+hrs) in country.
Hard to see over the H-60 dash.
Have a hard time seeing the CDU and having good clearance over the dash from the left seat.
have to hunch/lean a little to bottom the collective
Have to put seat in the lowest position to comfortably grip cyclic. With seat at higher positions it puts my wrist at an awkward angle and is very uncomfortable, it also makes it hard to reach all the buttons on the cyclic.
Height Adjustment: When I put the seat up it feels as if the belts around my shoulders pull down on my back and I have noticed that it is very painful after an hour and a half of flying. I'm not that old that I should be in that much pain and I don't have back problems in other time on or off the job.
Height/Fore Aft adjustment-moving the seat where I need to move it in order to keep my back in line with controls so I don't slouch causes the glare shield to cover up master caution panel.
I adjust my seat as high as I can but not so high I cant see the instruments under the glare shield

I adjust my seat so I can bottom out the collective and reach all of the switches. The problem is that the dash in the H-60 rises too high. I am 5'10" so I am an average size person.
I adjust the seat height all the way up for maximum visibility. Even with the seat all the way, and a seat pad, total forward/down/side visibility is still poor in the H-60. The 60F seat adjusted higher than the HH60/60S, but was un-armored.
I am tall and I need to adjust the seat up, but that makes my head with helmet on, be pushed forward by the circuit breaker panel. The glare shield design and location of vertical and horizontal supports reduce visibility enough to where there needs to be a lot of neck movement in order to accurately scan for traffic and obstacles. This is fatiguing after even a few hours in the cockpit.
I can bottom out collective, but it's not comfortable because I have short arms.
I can bottom out the collective but it is only because the harness doesn't block me from leaning to the left.
I can bottom out the collective, but it is difficult to do. I have to bend sideways to do it.
I can mostly reach all the switches, but the center console is so big in the MH-60R, so I have to release the inertial reel in order to reach the far top corner switches.
I can never reach all switches with harness locked in 53
I can see over the dash, but my short torso length requires me to adjust the seat all the way up and almost full forward.
I cannot move my seat to a position that allows me to see over the dash and keep the collective and cyclic in a comfortable position. Ultimately I have to raise my seat so that when I sit straight I can see over the dash and when I hunch down I can bottom the collective. The cyclic also ends up being uncomfortably low with the grip sitting between my thighs.
I cannot reach all the switches with the seat harness locked. It is not a function of fore/aft or height adjustment, rather some switches are too far on the other side of the cockpit for me to reach (and I have long arms) unless I unlock my harness. Specifically, if I'm sitting in the left seat I can't reach the switches on the forward right portion of the lower console or the switches on the forward right portion of the upper console (vice versa for sitting in the other seat).
I don't think the seat is necessarily the problem, it's the width and length of the center console, even from the right seat you can't reach the backup pump with your harness locked, flight critical switches and controls are not a problem
I find myself in a hunched position. If I sit straight up my right arm, holding the cyclic, must remain off of my thigh and held forward. In a comfortable position, sitting straight up, my right arm would run down my side and my forearm would rest on my thigh. From this position it is impossible to reach the cyclic. It is impossible to position the cyclic in a way that would allow for comfort and control. Therefore, we should at least get better seat cushions.
I flew the H-3 and H-60S. In the H-3 had issues sitting comfortably and flying at max speed. At this speed the cyclic would be all the way forward, almost hitting the dash. This was very uncomfortable! In the H-60, the dash seemed to always limit visibility so I would try to adjust the seat almost as high as it would go. This would make bottoming the collective a little uncomfortable i.e. required a slouch position.

I have short arms, so to bottom the collective I have to lean to my side to get it fully down.
I have to lean forward and right to lower the collective fully with my seat at the proper height to see over the dash. I still have my harness locked when doing this.
I have to sit with the seat all the way down to be comfortable, however, this reduces the effectiveness of the seat stroke in the event of a crash.
I have to unlock my harness in order to reach the backup hyd pump/backup t/r switch in the 60b.
I like to sit as high as possible in order to increase visibility over the large H-60 instrument panel. When I adjust the seat to my preferred height I have trouble with my helmet striking the circuit breaker panel behind me. This problem is exacerbated when wearing a battery pack for night vision goggles. If I adjust the seat forward to provide more clearance between my helmet and the upper circuit breaker panels, then my knees hit the instrument panel. As a "fix" I usually sit lower than I would like to avoid hitting my helmet or my knees. As a note, I never have any issues bottoming out the collective when I need to.
I must unlock the set inertial reel if I am to reach numerous buttons. The dash is also pretty high, but I have been able to get used to it. The cockpit can get crowded when a helmet bag is placed on the hook provided to suspend it. I have noticed when in the right seat my left arm does not have the full range of motion fore and aft because of my bag being pushed forward by the fire extinguisher and back by my elbow.
I need the seat all the way back because I am a taller individual. With the seat all the way back, I cannot sit up straight without my head banging into the circuit breaker panel. Therefore, I have to sit with my back arched forward or my neck arched forward which leads to discomfort.
I need to unlock the seat belt to reach switches on the far side of the lower instrument panel
I think the glare shield is too tall and sticks out too far. If I adjust my seat forward and up to where it's comfortable, it's hard to see the fire light, and if I lower it it's hard to see over the glare shield. On a somewhat related note, the middle windscreen, which is made of plastic, is all but impossible to see through, especially at night.
I think the seats should have more room for aft adjustments.
I wish I could move the pedals further forward so my knees would hurt less. I can move the seat all the way back, but then my head hits the CB panel overhead and I have to hunch forward to reach the cyclic
I wish the center strap, holding the release for the harness system, was adjustable in length.
I wish the left (copilot) seat would adjust a little further aft.
I wish the seat had more aft movement so I could stretch my legs out on long, 3-4+hour flights.
I would like to adjust my seat higher for better seat stroke during a potential crash, but this inhibits me from reaching full down on collective.
I would like to move my seat further back because sometimes the cyclic movement is limited due to my close proximity.

If I had the seat exactly where I wanted it to have an optimal view over the dash, my legs would get in the way of fully displacing the cyclic, so I accept a slightly worse view.
If I put the seat as far up as I can to see over the glare shield and to increase the effectiveness of the stroking seat, I will have to lean over to put the collective full down
If I put the seat in a comfortable location, visibility is reduced especially in shipboard environment
<p>If I put the seat up where I'm comfortable to see over the dash, for a good site picture, I have to lean to the left in order to push the collective full down. My arm isn't long enough to see over the dash and use the collective full throw.</p> <p>When my harness is locked I can't reach a lot of the switches if they are on the other side of the cockpit. The most noticeable is when I'm in the left seat and cannot reach the Backup Pump without unlocking and leaning forward.</p>
If my harness is locked, I cannot reach the Back Up Pump Switch. If I move my seat forward, then my knees are bunched up and I feel like I am scrunched up against the cyclic
If the seat isn't fully aft, I cannot sit in it at all
If you adjust the seat so that it's comfortably high to see outside the cockpit, it's difficult to see the instrument panel, which means either flying with the seat too low or having to bend down to see the instruments.
If you want the seat to be most effective in its ability to stroke (as per NATOPS) then it needs to be at the highest practical setting. I keep my seat high which has me constantly leaning to the left for low collective settings. When locked, some cross cockpit switches are impossible.
I'm fairly tall. I just never seem to be able to adjust enough so that I'm not cramped in the cockpit.
In certain positions in the H-60 left seat, helmet can contact the circuit breaker panels. While this has never resulted in an inadvertent circuit breaker pull, it forces seat adjustments that may not be ideal for fatigue reduction.
In order for me to see over the cockpit dash, I had to adjust the seat up (2-3 clicks from top). However, I will have to force my left arm to push down in order to bottom the collective.
In order to bottom the collective I have to unlock the harness to lean forward. In flight I cannot adjust the seat enough to reach all the switches with the harness locked. I have to have the seat all the way up to see over the dash. With the seat up I cannot comfortably adjust the collective because the height of the collective does not adjust with the seat (shorter people do NOT tend to have longer arms).
In order to have the best possible visibility over the dash, I have to raise my seat so high that the dash blocks a small portion of the master caution panel. Also, in order to prevent the cyclic from hitting my legs, and thus allow full control deflection, I have to move the seat to its most aft position. This does make it difficult to reach all switches in front of me, if my harness is locked. I also have a very difficult time reaching an open door to close it if I have strapped into my seat, even with the harness unlocked.

In order to see over the glare shield, I have to put the seat all the way up which means to bottom the collective I am sideways and still can't see very well
In order to see over the dash well enough, I have to raise the seat up to the point that I have to lean to the left in order to bottom out the collective putting strain on back muscles. I don't move the seat fore/aft at all and in order to execute certain takeoffs, I need to move the cyclic all the way into my crotch.
In order to see well over the dash, I have to lean to bottom the collective.
In several aircraft, the glare shield is in a position such that I can't have the seat up as high as I would like and still see the Master Caution.
In some aircraft, especially HH-60H, cyclic is more likely to impact 5 point harness release.
In some H-60 aircraft, I feel that the seat does not adjust quite as far aft (only a matter of a few inches at most.
In the H-60 cockpit, it is impossible for one pilot to reach all switches; but I can reach all switches on the side I'm sitting on given my normal seat position.
In the H-60S the left seat pilot does not have enough room between the collective and the seat to reach a hand between and lock the seat if the collective is mid position.
In the HH-60H the seat does not move far enough aft. As a result I have to bottom out my seat and change my sight picture to prevent my knees from being restricted by the instrument console. Additionally the HCU takes up too much space and further restricts my ability to NOT block the flight controls
In the MH-60R, my main problems are seeing over the dash and reaching all of the AFCS panel switches with my harness locked. I can adjust my seat height so that I can see over the dash and still bottom the collective, but the Master Warning panel then impedes my vision of the flight and mission displays. If I keep my seat low enough for unobstructed vision of the displays, I can not see completely over the dash.
In the SH-60B, as ATO, it is nearly impossible to reach switches controlling Eng Anti Ice / De-Ice / Pitot heat / BU t/r, (switches on right side of cockpit) while remaining strapped in.
It gets too cramped can't push peddles far enough fwd
It is difficult to find the optimal seat position to allow me to have my harness locked while being able to have good visibility out the front while being able to bottom the collective all at once.
It is difficult to reach switches on the far, forward side of the lower console.
It would be ideal to be able to tilt the seat.
It would be nice to have the seat be able to slide one to two inches aft of its current position to allow for more freedom of movement.
Just have to unlock the harness to get to some of the far switches.
Just worried as a tall individual that the stroking seat's advantage is nullified by having to sit so low in order to not hit my head on the top of the aircraft.
Knee height/angle once adjusted for view and reach.
Knees in the dashboard, and instrument panel foam cover obscures view.
lack of lumbar support

length from seat to knee is not adequate to fit my leg, my knee is wedged against the instrument panel in the H-60
Like to sit high to see over dash, but makes it tougher to lower the collective completely. Knees hit dash with seat all the way aft.
Lumbar support pad is only good on brand new seat pads
Most of us adjust the seat full aft, myself included. This is to get full range with the cyclic. Radio Freqs and other commonly used switches are out of reach with harness locked.
My arms a little short. So, I either have to be far enough forward to bottom out the collective- or I have to be low enough. If I sit low, the dash is in the way, if I sit forward, the cyclic is in the way. In emergencies, I can hunch over and bottom the collective no matter what, and can see over the dash enough. But I cannot reach all of the switches with the harness locked.
My head hits the top circuit breaker panels, and the battery packs of the NVG's hit the back, limiting my Field of Vision.
My knees occasionally touch the bottom of the mission/flight displays. Comparable to sitting in a chair that's too high for its table. Not a big issue/concern.
My major concern is being able to bottom out the collective while maintaining the ability to adequately see over the glare shield.
My problem is a combination of height adjustment and fore/aft adjustment. With the seat all the way aft, my knees still hit the glare shield regardless of seat height position; this requires pedal adjustment aft (toward the cyclic) for my feet to reach the pedals (because of the glare shield obstructing my knees). So, in an ideal world, the seat could adjust aft another 3 inches allowing my knees to clear the glare shield, allowing the pedals to be adjusted forward, and allowing me to fly in a position other than looking like I'm flying a clown car
Nearly impossible to find a good position that satisfies the need to see well over the glare-shield, bottom the collective, reach all the required switches and keep the harness locked. MAIN ISSUE is being able to bottom the collective and see over glare shield.
No ability to recline for comfort.
No having clearance in the leg area. Either sacrifice leg comfort or visibility over dash.
No problems however the cyclic is short enough and the collective low enough when bottomed that people are more comfortable leaning forward.
Not being able to tilt seat fore/aft forces pilot to hunch, which causes lower back pain.
Not enough aft adjustment to have full movement of the cyclic
Not enough leg room.
Not enough room for leg extension. knees are up against the dashboard
Not reaching all the switches is a necessary reality (considering the size of the center console). My biggest problem with the seat (besides discomfort) is that even in the far aft position my shoulder blocks the green utility light which is necessary on NVGs.

Nothing with the seat - it was the damn foot pedals. They could only be adjusted once on APU power. Try climbing into the helo after a 63" squirt flew the bird. I was gnawing on my kneecaps with my front teeth!
On long flights it would be great to fully straighten my legs. I can't really do that in the h60
Other = The seats in the TH-57 are not adjustable. I do not have problems with height adjustment, but I wish I could have more leg room since I am tall.
OTHERS: WHEN SITTING TOO HIGH, CANNOT SEE WARNING LIGHTS
Placement of the glare shield makes it difficult to both see well over the dash AND see all my caution lights.
Really the only issue I have is that I can't see over the Dash very well unless I am all the way up. When I am all the way up I can't see the "Master Caution" warning light.
Regardless of seat position, cockpit design is such that there are certain switches that I can't reach with the seat harness locked. Most are cross-cockpit. I have "average" length arms.
Seat adjusts fine for controls and view but can't reach the tail rotor backup switch with the harness locked.
Seat cushions are continuously sliding and have no good mounting points. Velcro is not the right answer for mounting a seat cushion.
Seat does not go back far enough, knee is constantly resting on the lower dash board. Also the cyclic displacement to the left causes my leg to get pinched between the cyclic and the collective.
SEAT RESTRAINTS ARE INSTALLED AS SUCH THAT THEY RUB ON YOUR NECK. TO FIX IT, I WOULD HAVE TO WRAP IT OUTSIDE MY FLOATATION DEVICE, BUT MOST OF THE TIME, THE RESTRAINTS STILL SLIP OFF AND RUB THE NECK.
Seat won't move aft far enough, my knee is wedged against the instrument panel when seat is full aft
Seeing well over the dash of the 60S is difficult due to its sheer size, although I can easily bottom out the collective. Also, my legs are so long that the bottom of the screens is an issue with bending my legs to sit comfortably and have full throw of the pedals.
Seeing well over the dash while bottoming the collective has more to do with the angle of the dash.
SH-60B has an extra foam padding over the top of the dashboard that requires you to lower the seat more than I want in order to see all of the vertical instrument display system (VIDS).
Sitting higher in the cockpit provides me a sight picture I am comfortable with during flight. However, while sitting high I am sometimes unable to certain instruments/gauges due to the dash obstructing my vision.
Some switches require me unlocking the harness to reach, such as anything forward on the center console.
Sometimes I have to unlock my harness to reach a particular switch
Sometimes my knees impact the bottom of the instrument panel if my seat is too high.

That tail rotor servo backup switch is just out of reach with the Harness locked. Very few people can reach it unlocked from the ATO seat in a SH60B
The actual adjustment levers are hard to reach while wearing gear and hard to actuate
The back of the seat does not allow the pilot to be seated without hunching over once the shoulder harness is secured. Always in a constant state of leaning forward.
The biggest issue with a 60S is being able to close the door.
The combination of being short and flying the -60 is pretty tough on the forward visibility. I have to put the seat up all the way to feel like I have a good vantage point (and I'm 5'9"). As a result, the range of motion I have with the cyclic is more restricted.
the difficulty was finding the balance between having full throw of the controls and not hitting my survival vest, etc
The giant glare shield isn't a seat adjustment problem, per se; it's kind of hard to see over by its inherent design.
The glare shield gets in the way of being able to read all of the instruments when the seat is set to a height that allows me to see over the glare shield and maximize the full stroke of the seat in the event of a crash.
The glare shield in the 60-Sierra has a foam extension for crashworthiness. In short order, and without fail, this is damaged by the heat and normal ingress/egress from the cockpit so that it no longer retains its original shape (hangs low/slopes downward). The result is a requirement to sit lower (reducing seat crashworthiness and over dash visibility) in order to see the Master Caution display pack (Fire/Eng Out/Nr/MC).
The H-53 has a nice adjustment of not only the seat but the collective as well. That way when I put my seat up high to see over the dash, because I'm short, I can adjust the collective to the proper height. As it stands now when I raise my seat in the 60, my arms are too short to bottom the collective unless I hunch over a great deal.
The layout of the MH-60S cockpit prevents me from setting my seat height to where I would like for outside reference while still being able to see the master caution panel
The leg straps do not loosen enough to fit my leg size comfortably
The needed reach is my challenge
The only issue I have is when conducting certain tests on the engine quadrant in the H-60. When having to prime the engines, I have to unlock my harness. This is a ground, FCF test only and not conducted on a regular basis. Additionally, it is difficult to see/adjust switches on the aft part of the center console, i.e. the FMCP.
The only switch I cannot reach with the harness locked is the backup pump switch, I have to unlock the harness. My main issue is the vest's radio getting in the way of my control of the collective.
The problem is the seat does not go back far enough and the seat restraint is not good on the family jewels.
The seat can't be moved far enough back in the H-60. My knees sometimes touches the dashboard. Everyone I know puts the seat all the way back.



The seat plain and simple is uncomfortable. About 1.25 hours into a flight your butt is numb and radiating pain and you are constantly making minute adjustments for moments of relief. Sometimes coming back to the boat after a double-bag, my legs (front and back of my thighs) hurt from just sitting still for so long getting back to the boat that it is difficult to concentrate on landing.
The seat position I fly in does not allow me to reach all the switches while my harness is locked while flying in the SH-60B however I can reach all switches while my harness is locked in both the MH-60R and MH-60S.
The seats on the HH-60H and the MH-60S are such that anyone around 200 pounds will not have full movement of the cyclic without having to move their legs out of the way (thus taking them off of the pedals). Add to this the added bulk of body armor and the situation is worse. The seat cushions themselves do not stay in place and slide forward, also reducing the space between the pilot and the cyclic. The lumbar support is literally a rag and will not stay in place, and the back support slides down and pushes the lower seat cushion further out.
To get good visibility over the dash my head sometimes contacts the switches in the overhead, and there is a large amount of discomfort in bottoming out the collective from this height.
To have the proper eye level set, I have to adjust the seat height so far down that my legs/torso form an acute angle (less than 90 degrees), putting strain on my lower back (stretched), sit bones (pressure), and spine (crunched forward).
To keep a comfortable/safe (bottom out collective and see over dash) flying position and good sight picture I adjust my seat height to a certain setting. At this setting I can reach the upper console but not get a good grip on the PCL's to bring them off. I end up unlocking, pulling PCL's off, then relocking harness during simulated emergencies. I also have to unlock to reach upper console switches on the other side of the cockpit.
Too short to reach everything but raising the seat too much makes it difficult to get full throw on the pedals. With harness locked, can't bottom collective or reach all the seats. I basically have to pick and choose which parameters I want to use to fly... full visuals, full controllability or safety vs. reaching switches.
Trade off between bottoming collective and avoiding excessive lumbar flexion.
Unable to reach the backup instruments when locked into the harness. Have a little trouble bottoming out the collective when the seat is situated to see over the dash.
Visibility over the dash is sometimes difficult, more so with the BLK 3 MH-60S ASE.
Visibility, it is a known Part I deficiency against the H-60 that will never be corrected.
When adjusting the height of the seat, the cyclic gets in the way of the handle to raise the seat and my arm gets caught.
When I adjust my seat height I can't bottom out the collective without leaning forward. When I adjust my fore/aft position I put my seat forward to reach all my buttons but it prevents the cyclic from moving full aft.
When I adjust the seat high enough to see over the dash I have to hunch over to hold on to the collective at its lower range of movement. Can't reach the switches on the opposite side of the consoles with the harness locked.

When in optimum outside viewing position cannot see all gauges/lights. When in optimum crash/stroke position cannot reach pedals.
When locked, I can't reach all of the switches and circuit breakers. In order to see all of the flight instruments my seat must be adjusted down to a point where I can no longer properly see over the glare shield.
When raising the seat to the desired height to maximize the downward stroke and give me the best view over the glare shield, the master advisory panel is obstructed by the glare shield foam.
When sitting right seat in the 60 I usually can't reach the RAD ALT HOLD button with my harness locked. I also usually have to lean over to bottom the collective in an auto if my seat is adjusted high enough to see over the dash, especially so in the shipboard environment.
When the seat is adjusted to see over the dash I have to lean left to bottom the collective. When the seat is aft enough that the cyclic isn't in the way I can't reach the center console switches without releasing my harness.
When the seat is locked I am unable to reach the switches on the far side of the upper and lower center consoles, regardless of which seat I am in.
While I am able to bottom the collective, it requires me to lean or slouch forward, altering my flight posture and changing my muscle memory.
With harness locked, I cannot reach the extreme forward/opposite side of center or overhead consoles. Also reaching the extreme aft portion of lower console requires twisting in my seat, which cannot be done with harness locked.
With seat adjusted properly, can't see the master caution light
With the battery pack to my goggles on and my seat in the "right spot" (i.e. I can see over the glare shield, reach every switch, lower collective, etc.; basically the best position for me to fly in) I have to cock my head forward otherwise the battery pack hits the circuit breaker panel behind my head. It doesn't matter which seat I'm sitting in (left or right). Most pilots have expressed the same issue and say they just fly cocked forward as well. Not great for back pain, or for assuming the "crash" position.
With the current layout the seat does not go far enough back.
With the H-60 seatbelt design as you tighten the straps your back and neck are forced into a convex position due to the position of the union of the shoulder straps and locking reel strap. A better design is the TH-57 that has the union much farther back so the straps don't pull your neck forward when tightened.
With the harness locked in the left seat, virtually no pilot can reach the backup pump or tail rotor servo switch.
With the height and fore & aft adjustment, unable to see all of the caution panel or the vids.
With the seat all the way back my knees still touch the dash board. In a crash I am sure I would break both femurs.
With the seat all the way back my shins still hit the bottom of the instrument panel causing me to sit in uncomfortable postures

With the seat at full aft, I cannot reach all of the switches and have difficulty lowering the collective full down, but if I move it forward at all, I cannot bring the cyclic full aft and my knees are blocked by the instrument panel.

Would like it to be able to go back another 3-4" so my knees clear the instrument console by more than 1"

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## APPENDIX H. SUMMARY OF COMMENTS ON SURVIVAL VEST

From question 52 of the survey, “Do you have any suggestions that could improve the survival vest?” the following appendix was created. The comments were slightly edited for typographical errors and misspellings. Comments were selected if feedback could be beneficial for NAVAIR engineers and/or decision makers of the NAVAIR Community.

A better flashlight holder and replace all L flashlights with sidewinders. Decrease overall weight of vest.
a better weight distribution more evenly. They are very bulky and do not accommodate the female anatomy well
A lot of bulky item on the left side. Would be better is some of those items, like the radio, shrank in size.
A strap in the back to make it a little more rigid. Improvements are limited in that regardless all of the weight has to be placed on the front.
Actually getting a vest that is actually fitted to the pilot would help; there were plenty of times I had to squeeze into a vest that was way too small in Advanced simply because that was what was available.
adjust the weight so the majority is not in the front which pulls your shoulders forward when flying
Adjustment of the straps to avoid crossing the spine.
Adopt the airforce vest or get rid of 90% of the parts. The radio is insanely heavy and our PRs are unable to get the 'new and improved' materials that are lighter. If there are good things out there, and it's an issue, allow the budgets to be augmented to afford these products. If it's not deemed necessary, eliminate them from the flight vests.
Airsave has been a significant improvement over legacy vest
All equipment is necessary if I ever have to ditch.
All of the survival equipment on the front of the vest causes the vest to sag forward and seems to pull my shoulders forward. This seems to lead to an exaggerated forward lean, which makes my posture even worse. I think this leads to the lower back discomfort, especially after long bags. I think the pulling effect could be alleviated (at least somewhat) with more even distribution of the gear on the vests, whether it's just better distributed on the front or even put on the sides, etc.
All of the weight is on the front, which exacerbates the 'helo hunch' and creates more stress on the back when sitting in the seat.
Allow more leeway to the individual for placement of gear and what gear is carried.
Allowing more flexibility in moving gear around.
An aircrewman in our squadron is about 6' 4" and is very skinny. He has the dessert vest and uses the soft body armor. He says that the soft body armor actually helps to keep his back aligned which keeps him from doing the hunch and helps his back pain.

Anything we can do to slim down the size and bulk of the objects on the vest is a great investment. The awkwardness of flying around the HABD bottle has always been a concern,
Better fit
Better weight distribution
Better weight distribution and better support for the posture.
chances of needing that stuff minimal, get realistic about what we have to have
COTS items are being procured and added to the PMA 202 list of approved alternates that are significantly lighter weight, continue this trend.
Crossing/singular strap design in back distributes strap pressure across the back and is also easily tangled or turned when donning the vest
Currently all of the weight is in the front of the vest, which pulls the shoulders forward causing more of a hunched position. Suggest to find lighter gear, redistribute weight more evenly, and even create a dry vest or modified wet vest for homeguard training.
cushions
Decrease size/weight of items, i.e.: the radio/horse collar.
Decrease weight or reorient to take focus off the back to carry the weight.
Desert vest seems better. Improve the body armor though so that it better fits the vests and is more effective.
Design and incorporate a survival radio the size of a cell phone. The current survival radio is archaic in both size and weight. The load-bearing design of the vest could be improved to more properly distribute the weight instead of placing the entire load on the shoulders.
Design it lighter / lower-profile.
Design it to have less weight pulling forward.
Design so that the entire weight of the vest is not hanging on the pilot's shoulders in flight.
Design thinner gear. Do we really need a four inch thick radio?
develop a flight system that allows for storage over a wider area, perhaps the legs.
distribute the weight differently
do away with it. the long term damage of the added weight plus possible egress hazard outweigh the benefits. Of course I'm an aviator so I never think that crashing will actually happen to me although I've picked up people who have. Seriously though the weight and bulk are extreme. I miss the old SV-2. I fly with air safe now. All I need is flotation, HABD bottle, and a radio.
Do not require flotation be on the vest when conducting overland flights.
Doesn't fit to body well despite best efforts of PRs. Make them form fitting.
Doesn't fit very well with seatbelts.
don't put all weight on the shoulders
Ensure the PRs are able to adjust to the personal specifications of where a pilot would prefer an item placed, but also ensure that placement is not improper.
Figuring out how to reduce the roll behind the neck may help (horse collar).

for people with short arms, the new vests (with everything in the front) makes it hard to reach the cyclic and to have full range of motion for the cyclic when you reach it. i.e. short arms mean you are sitting closer so the cyclic runs into the new vest when pulling back.
Get PRs that know what they're doing.
get rid of garbage in it that is unnecessary and allow crewmembers more input to what they carry and how. For overland, finally use design not "NAVAIR-approved", as those are all completely inadequate or a step backward. Allow actual experienced pilots to aid in design and approval (if necessary), and not just engineers, desk-jockeys, non-flyers, and paper-pushers. The NAVAIR process is broken, and not just with ALSS.
get rid of horse collar
HABD/HEEDS bottle can impede movement if not properly located on vest. Cyclic can come into contact with items on front of vest in certain flight profiles.
Horse collars are uncomfortable as are the long knives that stab you in the leg and disrupt circulation throughout the flight. I have the "new" radio pouch on my vest and find it to be a marked improvement over the old one due to the new orientation.
I don't know if this is a suggestion for improvement, but it just seems so front heavy on me, that it pulls me forward and pulls on my neck. High tech super light gear? Like the gucci stuff backpackers buy? Counterweights in the back to not make it sag forward?
I flew with the older style SV-2, so I don't know if the newer version is an improvement. But overall, need something that distributes the weight better and is slimmer fitting.
I have no issues with the survival vest
I have PRU-70, which is the new vest that the body armor slides into. I can't believe it made it to the fleet without having a d-ring that a rescue hoist can be clipped into.
I like the survival vest, it is just a lot of weight on the front of the vest but there isn't really much we can do about that.
I think they should be lighter
I wear the PRU-70 vest and strongly prefer this vest to the Airsave vest. My suggestion for improvement to the PRU-70 is to add velcro to allow for securing the side flaps after the plastic fasteners have been closed. The current design causes the flaps to bunch up when the vest is adjusted to fit tightly.
If the survival vest itself served as our seat harness by clipping into the seat (such as jet harnesses), it would relieve significant weight put on the upper body.
In the past, we did not have to wear a vest with flotation in the HTs. About a year ago, flotation vests became mandatory for all flights. I have noticed a huge increase in my back/neck pain since this change. The new vests are considerably heavier than the old ones. I can feel the weight pulling on my shoulders and upper back as I sit in my seat. I wholeheartedly feel as though our new survival vests contribute directly to my discomfort and pain. I don't have any suggestions to improve the vests because the AMSOs have already streamlined them quite a bit. I do have a different suggestion: do not require us to wear them because we DO NOT FLY OVER WATER. The old policy required us to wear them only when the flight was going to fly over water and no one in the HTs abused this policy. *Off soapbox*

Incorporate a back support into the vest itself, like some tactical armor carriers used by ground forces.
Incorporate some of the equipment into the back support of the seat that a pilot can strap into such that it would come with him in an egress and yet have no effect on posture or contribute to a hunch. All the current weight of the vest is in the front pulling down on the shoulders.
Issue a second lightweight version for flights around the conus and near to shore.
It is very front heavy and I already lean forward a lot to be able to see. If you could reduce that or change the location of the weight that would help.
It would be helpful to put the HABD bottle and radio in different locations so that I don't have to hold my arms awkwardly around them. Also, if there was a way to get the horsecollar from digging into my neck.
It's very heavy. When we get an opportunity to design new equipment make weight a priority.
I've tried (unsuccessfully) several times to have the horse collar adjusted such that it does not hang on the back of my neck when I'm in the aircraft. The floatation creates annoying pull on my neck that may contribute to pain and discomfort.
Keep making it lighter and improve the equipment. The new knife and sidewinder flashlights are great. New body armor/vest used in the NAAD is a significant improvement over the previous vest.
keep making it lighter with a slimmer profile
Keep using improved technology to update equipment in the vest and allow the squadrons flexibility to determine requirements based on mission (why do we need floats and sea dye markers at Fallon?)
Leg straps, although vital to rescue are cumbersome and contribute to the helo hunch. Leg straps need to be redesigned to alleviate this issue.
Less bulky, restricted movement in current design
Less bulky. Find a way to have fewer items hanging from it. More streamline
Less is more. Required items are required, but it still seems very cumbersome to go flying in.
less weight
Less weight
Less weight on the shoulders.
Less weight on the shoulders. Not sure how that would work, but that seems to be the cause of the discomfort for me.
Lighten the weight or redistribute it to alleviate it causing you to hunch over.
Lighter
Lighter equipment and less bulky leg straps. Legs straps double up right underneath my sit bones and made a hard surface to sit on.
Lighter fabrics along with unnecessary gear removed. If I go down in CONUS I'm not going to have to use the standard gear and play survivor for long.
Lighter gear, the new flashlights and knives we've received are an improvement. Unfortunately, everything on the vest has to be on the front which means all of the weight pulls down on the pilot and leads to hunching.



lighter more updated equipment. The new flashlight and knife make a big difference
Lighter weight
Lighter weight and smaller items. The new LED flashlight is a great improvement.
Lighter weight equipment. Also, equipment small enough that it does not interfere with range of motion of the arms.
Lighter weight equipment. Can they make a HABD bottle out of a lightweight composite?
Lighter weight gear. Technology allows for it, we simply won't pay for it.
lighter weight radio, smaller HABD, smaller floatation
Lighter weight radio.
LIGHTER, BETTER FIT.
Lighter-weight components.
Look at other services' vests. They're much nice than ours... just a thought.
Lose some of the gear, make it lighter
Lose the weight, adapt USCG/USAF Vests and HGU-56 helmet that are lighter and ergonomically designed
Lower profile LPU
Make all the gear a little lighter.
Make it less bulky
Make it lighter and distribute the weight move evenly from front to back.
Make it lighter and distribute weight better (more evenly as everything is obviously low and on the front weighing you down).
make it lighter or redistribute the weight so that it doesn't pull you forward
Make it lighter overall. There are many items on the vest that could be replaced with lighter more modern components.
Make it lighter!
Make it lighter! Issuing lighter and smaller gear would stop the weight pulling down on the shoulders and upper back. Using the army design would take away some of the excess fabric making the vests cheaper to design and lighter and more comfortable to wear.
Make it lighter, if possible.
Make it lighter.
Make it lighter.
Make leg straps more comfortable. They are thick and tight around the crotch which when sitting, tends to cut off circulation.
Make leg straps wider or padded to increase blood flow and reduce point pressure. Remove all bulky items from under the left arm so that I don't have to lean left to bottom the collective with the seat in the up position. Reduce weight and bulkiness of flotation collar so alleviate pressure on neck and shoulders and allow my helmet to turn left and right without catching on the collar.
Make ones that start out as smaller sizes. A one size fits all approach does not work with the smaller females. Items are in my way when I am trying to use the flight controls and jam into my legs or ribs.

Make the butt straps softer and more comfortable so that a pilot feels more comfortable stretching and moving around.
Make them fit better. Mine is too big but because I'm small anyway cant be adjusted anymore.
make them less bulky and lighter.
Minimize pockets at waist level and on the sides
minimize some of the gear or make it more fitting to the body. HABD sticks out quite a bit and makes it easy to move around it
More fitted vice hanging off your shoulders.
More snug fitting. Loose/hanging down on small frames is painful on the back.
Move the horse collar back down to the waist level. Reduce the weight of the radio. Provide a standard issue folding blade knife to REPLACE the fixed blade version.
Move the radio so it's not interfering with my collective hand!
Move the stuff that blocks the right arm from fully contacting the chest. The gear that is mounted on my vest on the right side causes me to have to extend my arm out forward, then bend 90 degrees to the left to hold the cyclic...this is the main cause of my upper right shoulder/rhomboid strain
NAVY MEDICAL HAS LUMBAR SUPPORT THAT CAN BE ISSUED AND IT SHOULD BE ISSUED VIA THE PR'S. IT CAN BE CONTROLLED AS ANY ALSS GEAR AND THEN IT WOULD BE MAINTAINED.
Needs better distribution of weight.
Needs to be more form fitting/cumbersome. Too bulky.
No, other than changing the stupid rules that prevent left-handed people from being able to have all their gear on the "wrong" side of their vest.
not so bulky. trying to sit up straight with things wrapped around your neck and weigh down your shoulders
Placement of equipment on the survival vest does not seem consistent. I recall instances when some survival gear (knife / HABD) was placed such that it contributed to discomfort in flight.
Possibly change the flotation so it does not force your head/neck forward.
Possibly look to integrate lumbar support into vest/ body armor.
probably carrying too much weight (in terms of stuff we don't need). I think eventually I'll get a the newer light & knife
PRU-70's are a much more comfortable alternative to the CMU-33's when body armor is required
Puts a lot of pressure on the shoulders and the base of the neck.
Reduce as much weight as possible, the radios are very bulky.
Reduce gear to only necessary for short term survival. Average time in the water is limited to minutes or hours vice days or weeks with current resources and recovery assets.
REDUCE PROFILE OF COLLAR INFLATION DEVICE. MOVE LOWER ITEMS UP ON THE VEST TO ALLOW MORE NATURAL POSITIONING OF HAND ON CONTROLS.

Reduce size/weight of equipment. Smaller radios. Smaller knife. Etc.
Reduce the gear. There is no need for all of it. The weight will cut down on the "helo hunch."
Reduce the weight of it.
Reduce the weight. If authorized I would wear a horse collar and have a heeds bottle if I could.
reduce the weight...particularly the radio and HABD bottle. Better integration with horse collar
Reduce weight
reduce weight
reduce weight and more even distribution of weight
Reduce weight of items
Remove leg straps and develop modular design: overland, non-combat; over-water, non-combat; over land combat; over water combat; armor. One of the recent survival vest PMA's at Pax proved the leg straps are unnecessary with the proper rescue hook clip.
Remove mandatory items as per NAVAIR and leave survival items up to the individual to lighten up the vest.
remove or update some of the equipment
Remove some of the webbing inside the survival vest, there is too much bulk and weight. New vests exist that have plate carriers for body armor installed, so separate vests need not be worn.
Re-position the weight so as not to pull the pilot's shoulders forward.
See if we can cut down the weight of it if possible.
Seems to be sufficient. Awkward only outside of the cockpit.
sidewinder flashlights. the old round ones shouldn't even be allowed anymore. they're just too bulky for the job we are doing.
Situate metal clips on the back of the harness so that they don't sit between the seat and the small portion of the back that actually contacts the seatback.
slimmer profile
Slimming it down even more would help, but I recognize that probably can't be done without taking out valuable gear. Vest design has improved significantly over the last 20 years.
smaller and less bulky
Smaller and lighter equipment would help the "helo hunch."
Smaller collar sizes would help neck maneuvering.
Smaller radios & LPU would significantly help bulkiness of vest.
smaller survival radios that are actually combat rated and not blow up while you are wearing them would be a great start. more weight spread out over the vest instead of all on the front.
smaller, more lightweight leg straps
smaller/lighter radio
Some design that does not place all emphasis on shoulders supporting the weight.
SOMEHOW ADJUST BLADDERS

Somehow make it lighter.
Sometimes the bulk of the vest on the right side impedes my ability to maneuver the cyclic as freely as I'd like.
streamline it. Less weight on the shoulders
Streamline!!!
Suggest creating a separate pocket for the first aid kit. I find that it is usually pushing against my stomach or causing the vest to "ride up" on one side.
Sure, too complicated to incorporate though.
Survival radio and HABD are most uncomfortable pieces of equipment. However, they are also the most important pieces of survival gear as well.
survival vest is fine.
Technology is present to make smaller led flashlights which create more light, last longer on cheaper batteries. Same for the radios, smaller and lighter would be better. Vests are bulky and heavy which creates the helo hunch.
the AirSave is a huge improvement over the old SV2. However, the vest could still be made lighter.
The leg strap metal buckles dig into the hips, perhaps something that isn't metal.
The Marine Corps designs a vest that allows for body armor to be slid into the vest, thus allowing one to drop the armor if in a water survival situation. That should be incorporated with Navy vests
The new PRU-70s are a vast improvement over the current Airsave vests. Their implementation should be fast-tracked.
The old SV-2s seemed better...
The position of the floatation on the survival vest pushes your neck forward creating poor posture during the flight. A thinner floatation horse collar may reduce the posture problems and reduce neck pain.
The radio is so big and bulky and there is no good place to put it. Maybe oriented vertically and moved more to the side, almost directly under the armpit.
The vest is too bulky and the entire thing is an egress hazard. There is too much equipment in it. When I'm flying, my arms are in a completely unnatural position because of the placement of unnecessary equipment.
The vest sags because my PRs tell me it must be fitted to allow the armor plate to be worn despite the fact my unit would never need to wear it. It looks really cool, but it just doesn't quite work the way it was intended. The old vest fit closer to my body and was less obtrusive to normal flight control movement than the airsave. The slack in the adjustable pockets cause them to sag off of the airsave and "rattle around." It doesn't feel secure. Also, the harness gets stuck between the lobes and the pockets. I have been "caught" by my own harness several times when getting out of the helo--very hazardous to underwater egress.
The vest seems fine. I just want to be able to sit up when I fly and still bottom out the collective and not hit my head on the CBs.
The weight needs to adjusted so it's not hanging on the shoulders during flight with a properly fit vest. Getting the weight off the body while in the seated position can help reduce the forward pull on the torso while seated.

There are a lot of smaller items that can reduce the weight and bulk of the flight vest.
thinner straps, the thick straps can cut into you when you sit on them
Too much stuff in front. I don't remember the old SV2 having everything so bunched up in the front of the vest.
Too much stuff, i.e. three knives?
Too much weight is being put on the shoulders and, when properly fit, the leg straps pull against the shoulder straps when not seated.
Use components that are smaller and lighter.
use newer, better, gear that isn't so bulky and heavy
way too bulky
Wearing a desert flight vest with back armor plate pushes me far enough forward in the seat that I cannot pull the cyclic full aft and causes the front of the seat pan to cut off circulation to my legs.
Weight distribution to the sides...I am not sure how we solve the problem, but for me the vest is a bigger factor than the seat.
We're already moving to remove extraneous gear, and smaller, light weight supplies such as the new flashlight, and new survival knife. Reducing total weight
Would be nice if the horse collar could be made in an even lower profile. Apparently I have a shorter than average neck, so my flotation got in the way, which further messed up my posture.
Yes, buy the Eagle Vest, from Eagle Industries for body armor
Yes, I would reduce the amount of items that SHALL be required to fit the theatre that we are operating in. There is no need to carry a full vest when flying to IB.
yes, light weight items. I think survival vest is over packed with non-essential items, bulky, and heavy.
Yes, lighten the load.
yes, use the desert pockets to realign the gear
Yes...how about finding some way of moving gear around so I don't have an extra 20 lbs hanging in front of me?

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## APPENDIX I. SUMMARY OF COMMENTS ON NVGS

From question 54 of the survey, "In your opinion, do you feel that NVGs contribute to back and/or neck pain?" the following appendix was created. The comments were slightly edited for typographical errors and misspellings. Comments were selected if the feedback could be beneficial for NAVAIR engineers and/or decision makers of the NAVAIR Community.

A LOT!
absolutely
Absolutely yes.
Absolutely! My 2Ps complain about it, I complain about it. Those things are heavy!
Absolutely! Too heavy. Battery pack on back of helmet does not allow head to rest all the way back, thereby further influencing the "helo hunch".
Absolutely!!!
Absolutely, 100% of my neck pain. I have tried every therapy known to man to relieve the knots in my neck... Chiro/acupuncture/cupping/Rolfing etc
absolutely, the constant vibration either laterally or vertically, the disks in the neck take a beating.
Absolutely.
Absolutely.
Absolutely.
Absolutely. Counterweights that are available in HT's are no longer available in the fleet. flying with these balances the weight of the goggles and strains the neck far less. I was told in my first fleet squadron that they represent a FOD hazard and were a banned item for flight, yet they are widely available in the HTs and FRS. This might be a squadron specific thing, but when I asked if we could purchase some of the newest versions that were not a FOD issue I was told funding is not available. Classic.
Absolutely. NVGs are heavy and most of the weight is distributed to the front of the helmet. Counterweights installed on the battery pack help even out the weight, but even the counterweights don't completely compensate for the combined use of NVGs and the HUD. This extra weight absolutely causes neck fatigue, strain, and pain.
Absolutely. The unbalanced goggles, too heavy in the front, combined with the eyestrain they inevitably produce causes neck and back pain.
Absolutely. They are heavy and not balanced fore and aft. So, it wears on your neck vertically and also tends to lean your head forward.
Absolutely. They are heavy on the head and fatigue the neck.

ABSOLUTELY. NEWER ANVS-12S ARE LIGHTER WEIGHT. FEW PR SHOPS MOUNT THE COUNTERWEIGHTS FOR THE ANVS-9S. WITH BODY ARMOR AND NECK INFLATION DEVICE INSTALLED MY HEAD CAN NOT LOOK LEFT OR RIGHT WITHOUT BEING ROTATED DOWN FIRST.
After about two hours the weight of the goggles begin to strain my neck
after long flights, certainly.
All battery packs should have the counter-weights that offset the heaviness of the goggles themselves. I feel better when flying with this feature on the pack.
Any additional weight to the head does, not much we can do about that.
Contribute significantly to neck pain. Typically, when flying a day into night bag, pilots will place the battery pack on the back of the helmet before sunset and then install the NVGs on the front when it's dark enough. This results in a lot of weight on the back of the head for a long period of time. I've started not installing the battery pack and just removing my helmet in flight to install it to avoid neck pain.
Contributes to neck pain because of the weight
Contributes to neck pain but pilots need to be able to determine that a 2 hour flight with NVG weights on the battery pack may be feasible, but using proper ORM it may not be advisable for a 6 hour flight out to the boat.
Counter weights help out. More weight on the neck, but it's a balanced load.
counterweights on the nvg battery pack would help a lot
Counterweights for nvgs need to be readily accessible to ALL squadrons.
Definitely. They are a huge weight on my head and neck and are extremely uncomfortable. There has to be something lighter weight.
Definitely, they are unwieldy and cause more rapid fatigue in the neck and back area.
DEFINITELY! My squadron refuses to order battery pack weights exacerbating the situation.
Definitely, to neck pain. The weight and increased amount of movement of the head needed due to decreased Field of View are the main contributing factors.
Definitely. NVG's cause neck and upper back pain as well as headaches.
Depending on the duration of use, NVGs can definitely cause me neck pain. Combined with the eye strain of being on the goggles, I have had combined neck/head aches as a result. Even with a properly fitted helmet and experimenting with different weighting configurations, "time of exposure" seems to be the most prevalent factor.
Even with the counterweights, they make my head fall forward putting constant stress on my head/neck.
Extended flights can cause neck fatigue due to weight of NVGs
Fleet does not support weights being added to NVG. (FOD issue) This would greatly improve NVG wear.
Hands down yes. The HTs seems to have counter weights and people that have used them say they work. Of all the crap the navy spends money on why haven't those gotten to the fleet. When I flight multiple night flights in a row its only a matter of time before my neck cramps up to the point I can't move it for a day
Having a pound or two sitting on your head sure didn't help.



heavier weight takes some getting used to
Hell yes
Highly. The stress placed on the back of the neck from the front weight is not effectively countered with weights in the back. Given the position of the flight displays in the 60S, taller aviators are forced to constantly hunch over to scan the instruments, which is exacerbated by the weight the NVGs have.
I am 100% certain they contribute to the problem, and it is made worse by the lack of counterweights.
I am sure that the NVGs contribute to my neck getting kinked at times but I have never had pain from wearing them.
I believe NVGs contribute to neck pain, but to a much lesser degree. The weight and unbalanced weight distribution over time leads to a sore neck.
I believe NVGs lead to neck pain simply due to heavy weights positioned on front of the helmet.
I believe they can contribute when a command does not provide or are not willing to provide the counter-weights that could be placed on the back of the helmet. The HTs provided them to the students when they went through the training command, but fleet squadrons do not have them. They are designed for a reason and I believe they should be made available to all aircrew.
I believe they contribute to neck pain if worn over a long period of time.
I definitely notice more pain if I can't find a set of NVGs without counterweights on the back.
I do not look forward to long NVD flights (greater than 2 hrs). Even with weights my neck begins to bother me.
I do not use weights on my NVGs and find the balance is acceptable.
I don't see how they could hurt your back, but do to their weight, extended use could cause a sore neck...never had that problem personally.
I don't think so.
I don't think that this is an issue, but the extra weight on your head and the extra head movements required to adequately scan certainly don't help.
I feel NVGs are a minor contributor. I did get some soreness but in general I was able to build up the neck strength to wear them without significant discomfort. Most pain was associated with 6+ hour missions early in workup cycles.
I feel that can contribute to neck pain
I feel they most likely contribute to neck pain
I get some neck pain from nvg's, not too bad though if worn for less than about 4 hrs.
I have always had neck pain after an NVG flight. I typically do not notice it until after flight, unless it is a 3+hr bag.
I have never attributed NVGs to my back pain. I have been flying with NVGs since 1999 and have 250 NVG hours at a minimum and was the Wing NVG program manager.
I have no issue with NVGs, but I no longer fly that much at night.

I have not noticed back or neck pain caused by wearing NVGs, but I have noticed an increased number of headaches after flying on goggles.
I have noticed increased neck pain when flying regular NVG operations
I have received some neck pain flying with the NVG's, but haven't felt any back pain from wearing NVGs.
I haven't had neck pain from the NVGs. I always use the weights on the battery pack, not sure if that's why.
I think NVGs can contribute to the neck pain. There is a lot of extra weight that is added when wearing those, especially for periods longer than two hours.
I think they almost certainly do, as they are a not insignificant wait on one's head that one is not normally used to supporting. This increases muscle use to retain proper positioning, which inevitable leads to neck pain. Unfortunately, while the weighted battery packs often help distribute the load more evenly, there is little to be done other than minimize weight of the goggles (which will be quite difficult to do due to the lever arm of the goggle).
I think they contribute more to headaches than neck pain for me.
I use the weighted pack, and have never flown more than 4 hours, so I have not really noticed it
I would say yes, for neck.
If I wear counter weights the NVGs don't bother me too much
if mounted properly no
If the counterweights are used, the NVGs are very comfortable.
if used for extended periods of time, I could see it becoming an issue
I'm sure they do.
In the HTs, we had counterweights for NVG battery packs. It increased the total weight of the helmet, but provided for better balance. At the FRS, the PRs and most instructors were unaware of counterweights and mostly dismissive of their utility. After flying without NVG counterweights for 4 years, I am "used to" the way goggles feel, but I still wish that my PRs would/could order the counterweights.
I've heard others complain about neck pain after extended nvg use, however it isn't a factor for me
just neck pain
maybe a little but then why do I have back pain during day flights?
Maybe neck pain due to long NVG bags.
maybe neck pain with the extra weight.
maybe to a little neck pain if you're wearing them for an extended period, i.e. 4+ hours straight.
Moderate
More like neck strain and tired muscles, occasionally it leads to actual prolonged neck pain.
Neck pain is always a result for flying with goggles. They make a scan extremely difficult and even with counter weights do not sit correctly on the helmet mounts.
Neck pain possible, weights elevate this
neck pain sometimes due to weight and position of wear for shipboard landings

neck pain with NVGs is constant
Neck pain yes, but this is significantly reduced with the newest counterweight design built into the battery pack.
neck pain, because of their weight. Hard to avoid, but still a cause of neck pain.
neck pain, yes. Purely from the weight on the front of the helmet pulling down on long flights. It wears out the muscles in the neck.
Neck pain. Esp. with the HUD and weighted battery packs.
neck pain. they throw the balance on your head off and the neck has to adjust for it.
Neck, maybe, but the addition of counterweights alleviates the discomfort.
Neck, yes. No for back pain.
NITE Lab frequency has been improved but in general I would argue that those complaining of NVG use are not using them properly. Availability of weighted battery packs is relatively low as I think the vast majority would prefer the weighted packs.
No, as long as they are adjusted and weighted properly.
No, as long as you fly on them frequent enough to build up your neck muscles.
No, but lack of weights do. I personally don't like the weights (I have a big neck) but I know many guys who have neck pain from lack of counterweights.
No, excepting any soreness when you first learn to use them because your neck conditioned for them.
No, I don't think NVGs are a factor.
No, just mild neck pain, mild , and only sometimes.
No, weighted NVGs work great.
No, weights are available for balance.
No, weights help greatly.
Not for me, the worst they've given me is headaches and hotspots on the crown of my head from prolonged flying with them.
Not for me. I have heard of other pilots having problems
Not really. Once my neck muscles adjusted to being on NVGs regularly, the goggles were no big deal.
Not really....my pain is all directly related to length in aircraft not mission specific events.
Not substantially unless it's been a long time since I've operated with NVGs, then it takes my neck some time to adjust.
Not sure about back pain, but definitely for neck pain.
Not the weighted ones. I think unweighted could because of the imbalance. But I only use the weighted style.
Not with a weighted battery pack.
Not with correct counter weights.
Not with the use of full counterweights.
NVDs significantly increase the chance of neck pain on a flight due to added helmet weight and increased head movement (increased scanning required).

nvg kits don't usually get ordered with the counter weight compensators for the back of the helmet which help relieve some of the strain of trying to hold the goggles up. without the weights, you are forced to tighten the helmet until it is uncomfortably tight and lift your head back in order to compensate for the helmet slipping forward
NVGs and the HUD add extra weight, the weights on the battery pack help.
NVGs are heavy, despite all the improvements. The counter-balance on the battery pack was a huge improvement, but now the entire system weighs more. Shorter tubes, with a wider field of view would help reduce the need to constantly turn your head back and forth to scan.
NVGs are the primary source of neck pain for me, but it does not cause back pain. After a few hours of scanning on NVGs, the weight of the goggles becomes noticeable and eventually becomes slightly distracting, especially during a long flight (4+ hours).
NVGs can cause you to look/extend the neck forward which adds weight/stress to the lower back
NVGs cause a slight increase in neck pain, and on long flights I am left with a moderately painful headache. It is also difficult for me to turn my head farther than 45 degrees to the left and right without shifting and adjusting my entire body.
NVGs cause neck pain, especially when worn more than 3 hours, even with balance weights.
NVG's certainly contribute to neck pain, especially if they don't have weights on the battery pack to balance the weight on the front of the helmet. With the weights, it's not too bad, but my neck does ache when moved side to side after an NVG flight.
NVGs contribute to my neck pain only.
NVGs contribute to neck pain because of the weight and where it is placed on the head. My squadron does not have counterweights available, but I think that could help.
NVG's definitely contribute to neck pain (not entirely sure about my back). Counterweights alleviate this somewhat and should be used by everyone.
NVG's definitely contribute toward neck pain. This could be rectified with better fitting helmets/helmet components (ear cups, liners). Also, I do not understand why there is no availability for counterweights to be used with the NVG battery pack. These were readily available in the HT squadrons and greatly aid in the proper positioning of NVG's on the head.
NVGs do contribute to neck pain, but part of that is that there are not enough intense flights with them (causing the head to move and adapt to the goggles). There are newer, lighter, and better visibility goggles out there.
NVGs do contribute to neck pain...after flying a long nvg flight it literally feels like lifting a large weight off your head when you take them off...a relief
NVGs do not contribute to neck pain for me, but they do add to overall discomfort on long flights
NVG's do occasionally on longer flights, or tactical flights that require lots of head movement.
NVG's for neck pain, yes. However I think that is a separate subject. The helmet, HUD, NVG, ICS, ear cups, and clear glasses don't work together nicely. Helo pilots should be given the option to wear the army helicopter helmet.
NVGs just contribute to occasional neck pain for me.

NVG's make the helmet more of a load, and counterweights are hard to come by.
NVGs only cause me head pain
Occasional neck pain, but necessary.
of course having all that weight on poorly designed (funded) helmets is a problem - to think otherwise is to think with your wallet too much.
ONLY AFTER MULTIPLE NIGHTS OF DOUBLE BAG FLYING.
Only if your neck isn't strong enough
only on extended length flights
Other than mentioned before, no. Wearing them often enough build the neck muscles. But I can see how wearing them infrequently can cause short-term discomfort.
Our community does not use the "counterweights" on the back of the helmets. I think the weight on the front of the helmet is a constant strain on the neck during NVG use.
Perhaps a bit of neck pain. This has improved over recent years with counter weights. Not every squadron has these and the squadrons that do have them do not have enough of them.
possible. I am done with them at the 3.0 mark. I find myself looking for reasons to raise them during flights, especially double bags.
POSSIBLY DUE TO WEIGHT OF NVG'S
Possibly, but they're more than worth the risk. If they could be lighter, of course, that'd be great.
Potentially. High moment arm with only the neck supporting.
Prolonged use could possibly lead to neck pain but the main issue is the seat.
Prolonged use will make the neck sore due to the weight and moment arm.
Prolonged wear (double bag = 6 hours of flight time) the NVDs can cause neck pain until adjusted and neck muscles developed
Slightly, as NVG tend to pull the neck forward.
Slightly. Obviously, the added weight generates muscle fatigue; however, I've never experienced severe back or neck pain because I used NVG's on a flight. I have experienced muscle pain as is normal after exercise.
Some neck pain due to seat harness reel being in the way
some to neck pain, not to back pain in my experience.
Somewhat. We definitely need to have counter-weights available for the helmet mounted battery pack. We do not have counter-weights available.
sure, it is an extra xx pounds resting on your head. of course there will be issues
The added weight is a factor with moving my head around during flights.
The bulk they add to the back of the helmet causes an increased forward hunch on the head to prevent the battery pack from hitting the circuit breaker panel.
The constant forward tilt of the goggles causes issues
the counterweights make a big difference
the uneven weight on your head. And if you use weights, that helps keep the goggles positioned and weight distributed, but it is just adding more weight to your neck.
The weight is a problem on long flight

They absolutely contribute to neck pain, especially after flying a double bag wearing goggles the entire time.
They are a definite contributor to neck pain following flights over 2 hours.
They are heavy so they might make your neck sore but nothing serious.
They can contribute to neck pain. Counterweights are good at preventing this.
They cause neck pain initially, but more frequent use seems to eliminate the problem, also counter weights are helpful but not always easy to come by
they contribute to neck pain because of the weight.
They contribute to neck pain because of the weight which is not balanced on the helmet. They have a tendency to slide the helmet forward which I have to compensate for by tilting my head back and constantly adjusting my helmet
they contribute to neck pain due to having to lean your head back to see the instruments
They do add a lot of weight and I will be more fatigued after flying with them on.
They do for me. I wear glasses, and the bottom of the wire frame is in the middle of my gauge viewing opening under the NVGs. This is an issue when I read the gauges as it requires me to lower or lift my head to read the gauges without the frame covering a portion of the gauges. I believe this action and the unavoidable eye strain associated with NVGs leads to a personal discomfort over a long period of time (3+ hours).
They do put more stress on the neck and lower back. It was better in the HT's when they had the counter weights, but I have never seen them in the fleet. (FRS either)
They do when you can't properly counter weight them. My squadron doesn't have any weights.
They do when you fly on them for more than a couple hours without counterweights. Our squadron only has 2 sets of the weights so they are hard to come by because there are usually at least 9 sets of goggles used every night.
They hurt my neck on prolonged flights. Counterweights help, but the vertical weight eventually wears down the neck.
They may over time. I have never experienced problems with them.
They probably don't help, but I get the same stress after long flights during the day and/or unaided.
Unweighted NVGs do. Army/Air Force helmet have better distribution of weight
We didn't have NVGs, I flew H-3s
wearing helmet counter weights helps weight distribution
Wearing the battery pack only for day into night events causes some neck discomfort. I don't notice it with the goggles on as well since the weight is balanced out.
Weight and moment can contribute to strain during head movement.
Weight of NVGs and weight distribution affect how the helmet rides on your head and can cause neck pain.
With a weak neck, pain has an earlier on set and increased severity. Pain decreases when I do exercises to strengthen neck.
With out a doubt the NVGs do contribute to my neck pain.

yes - extra head movements required over back of the ship contribute. Lack of symmetrical balance in the NVDs weight wise exasperate the discomfort condition. Squadron needs funding to provide all aircrew with the counter balance weights that neutralize fore-aft weight of the goggles.
Yes - neck pain, but I'll take whatever pain for the other advantages NVGs give me. Counterweights don't always help - on long flights they just make everything heavier.
yes at first, then you build the muscle structure to compensate
Yes because we do not buy the weights to counter the weight of the NVGs on the front of your helmet.
yes but weights are helpful
Yes do to position and weight strain placed on the neck (especially during long NVG flights).
Yes it is an additional 5 pounds.
yes of course. very heavy on the front of the head often limits my ability to fly long missions and concentrate due to increased pain in the neck and upper back
Yes some what. Part of the issue my be helmet fitting. Over time the helmet padding looses, with a looser helmet contributes to cocking the head or shifting the helmet to ensure the heavier goggles are positioned correctly, This coupled with the extra weight of the NVD's themselves add to the stress on the neck.
Yes they are 9 lbs of weight on the front of your helmet with nothing to hold it up but your neck muscles. Counterweights designed for use with NVG's are non-existent outside of CNATRA and almost impossible to acquire through supply.
Yes they do. If we could design the same sort of system independent of the helmet, much like the visor idea in #51, this would help two-fold. With back and neck pain and improved vision.
Yes to neck pain sometimes.
Yes to neck pain, squadrons need to get funding for NVG counter-weights. These would alleviate any neck pain caused by the goggles
Yes! NVG's are the worst. I have neck problems due to NVG's.
yes!!! to neck pain!!!!
Yes, neck pain is a result of the added weight your head and neck are supporting
Yes, once again they are an additional weight with a lever arm about 6 inches in front of your face. Add the HUD and this is a significant contributor to fatigue which leads to poor posture which leads to long term effects.
Yes, the weight of the goggles vs. the weight of the battery pack not well balanced.
Yes, a bit. Need a better counterweight to balance forces while wearing NVG's.
yes, a helmet coupled with a few pound device protruding off the front creating an addition moment, then add on a VFR scan...equals neck pain.
Yes, absolutely. Especially day into night flights where you wear just the battery pack or the goggles up for the first hour or more of the flight. Also, the counterweights are not widely available in the fleet. In general, it will be nice to get a lighter set.
yes, add the HUD and even more so.
Yes, added weight and strain on the neck. Lighter NVG's would be better, and a better balance with the battery packs.

Yes, after long flights with NVGs the neck definitely feels tired and stiff. Not just from the weight but from having to constantly move my head to keep up an outside scan.
Yes, although I tend to get headaches from hotspots or long flights vice neck/back pain.
Yes, because they are heavy. However, the more I flew with NVG's, the more I got used to them. I feel like my neck muscles developed because I wore them so much on deployment.
Yes, better balancing of the goggles could provide help in this
yes, but counterweights help
Yes, but in my case it's only because I need a new helmet liner.
Yes, but I've gotten used to it.
Yes, but less so with the counter weights.
Yes, but mostly because they are heavy.
Yes, but not significantly.
Yes, but the counter weights have helped
Yes, but to a smaller degree than the seat situation.
Yes, but using the counterbalance weights seem to help.
Yes, could be lighter / counterbalance better.
Yes, counterweights need to be provided they helped a lot in the HT's
yes, definitely
Yes, definitely neck pain. They are very heavy on the front of the helmet.
Yes, design has not been improved since mid-90's. Weight is the same, and size has not been reduced.
Yes, due to the imbalanced strain placed on the neck.
yes, due to their weight
Yes, especially in commands that do not have NVG counterweights.
Yes, especially when the PR shop cannot figure out how to get the weights for the back of the helmet on the battery pack.
Yes, especially with no counter-weight on the battery pack. Some commands will not buy the counter-weight
Yes, even with counterweights on the back of the helmet.
yes, for me NVG's cause upper back/ neck pain
Yes, I believe it is helpful to use the counterbalance on the helmet to keep them better in place, but our squadron does not have them. The weight also contributes to neck strain.
Yes, I definitely have increased neck pain during the weeks where I have increased use of NVGs. My suggestion to eradicate neck pain that's contributed to NVGs is to design a Night Vision system that is integrated into a visor. This will not only reduce the weight the neck has to support but would allow for wider field of view and possibly aircraft instruments which improve safety.
Yes, I don't experience neck pain on regular flights; only those with NVGs. Pain gets worse the longer the flight.
Yes, I think that squadrons should have counterweights more readily available.



Yes, if you fly with them long enough, they start to wear on you as you have to move your head a lot for scan. Esp. tactics and ship bounces.
Yes, mildly. They are heavy and require a lot of neck movement. I fatigue after 2 + hours of use.
Yes, neck pain due to the weight and shift in helmet position. Definitely think the few times I have been able to wear properly counter balanced (weighted) goggles it was 100% better.
Yes, neck. Lighter NVG's would definitely be better, especially for long flights
Yes, need to develop low profile/low weight NVG's.
Yes, NVGs contribute to neck pain. We need to look into counterweights (like we had in the HTs) or making the NVGs lighter. The counterweights are considered "impossible" to purchase at your fleet squadron
Yes, NVGs on helmets contribute to extra weight and neck pain.
Yes, putting an additional weight on the back of the helmet helps.
Yes, short-term neck tiredness--not pain necessarily.
Yes, significant additional weight, plus unbalanced
yes, slightly to neck pain
Yes, the added weight of the helmet, goggles, and batteries puts added stress upon the neck.
Yes, the added, continuous strain on the neck is not good.
Yes, the counterweight to the helmet is impossible to get, it should be standard issue.
Yes, the current NVG design contributes to back and neck pain due to the front loading of the weight on the helmet.
Yes, the extra weight increases the torque on your neck
yes, the helmet is heavy and causes some stress to the neck, but the NVD adds even more weight. Unfortunately, using NVD also requires the pilot to constantly move the head back and forth to see (because of the reduced field of view). So, in the aircraft, the head and neck are most active when they have the most weight hung on them.
Yes, the proper counterweights are not readily available.
yes, the times I have experienced pain or soreness, often it is during NVG ops
Yes, the total weight on my pencil neck after 4 plus hours leaves me with a stiff neck the following day.
Yes, the weight and position of mounting is a cause of neck pain
Yes, the weight set at a moment arm on the front and back of the helmet hurts keeping it balanced.
Yes, there is additional weight on the neck during long flights even if the helmet is fitted perfectly.
Yes, they are heavy and cause some neck pain.
YES, THEY ARE PRETTY HEAVY AND CAN BE HARD ON THE NECK IF NOT WEARING COUNTERWEIGHTS ON THE BATTERY PACK. WE DON'T HAVE COUNTERWEIGHTS TO WEAR HERE AT MAYPORT.
yes, they are the one and only cause of any neck pain I have had in the aircraft
Yes, they are too heavy for flights longer than 2-3 hours. Counterweights just aggravate the problem.

yes, they can if not balanced and continued use multiple nights in a row.
Yes, they definitely contribute to neck pain in a lot of individuals
Yes, they definitely contribute to neck pain. The unbalanced nature of wearing nvg's put strain on your neck often leading to headaches for me.
Yes, they definitely do. My squadron won't let us use counterweights or won't buy them, but they would help counter balance the NVGs. No weights on the battery pack make them much more uncomfortable (having flown with both configurations). My neck only hurts without the use of counter weights on the battery pack.
Yes, they need to be lighter and more compact
Yes, they place a lot of weight in the front of the helmet pulling your head forward. Strains the neck muscles after awhile.
Yes, they put unusual strain on the neck, could be mitigated by counter-weights
Yes, they sometimes are too heavy causing neck pain
yes, they're heavy, so after a while it wears on your neck
yes, they're just heavy after a long flight and each head movement places strain
Yes, to back pain due to the weight of the NVG with no counter balance.
Yes, unbalanced weighting fore to aft. Tendency to tilt head forward/down requires neck muscles to work harder. Weights for the battery packs exist but often are difficult to come by.
Yes, unfortunately, but without technologies not yet existing with regard to weight, I'm not sure how to improve them.
Yes, unless you have the counter weights on the back of the NVDs, your head is forward heavy. I do not know any pilot whose neck is not sore following an NVD flight (if they do not fly with them regularly)
yes, use the counter weights on the battery pack
Yes, very much so. Neck pain specifically due to the weight and frequency of use for helo pilots.
Yes, we need to purchase the counter weights.
Yes, weights help with the neck not falling forward, but then increase the overall strain also.
Yes. Especially when worn for extended hours.
Yes. Extra weight pulling on back/neck muscles. I have a little over 500 NVG hours. During the first 350 or so of that, counter weights were never available in my squadrons (nor did I know about them to ask if they could be ordered). A few years ago, my wing started to provide counterweights. I tried them once and couldn't tell a difference. I didn't continue to use them purely out of laziness (takes time to put them on my helmet). So potentially I could eliminate some of the pain by trying to use them again. I rarely fly goggles anymore, but if I do again, I will give the counterweights another chance.
Yes. For longer flights wearing NVG's, the effect of the extra weight on your head builds up over time and puts a strain on the neck.

YES. In flight school they had counter weights to put on the back of the goggle battery packs. In the fleet (where we actually use them all the time) they didn't have those weights. The counterweights were awesome, although they made the goggles heavier, it allowed your neck muscles a break. The helmets are also not made for having such a large weight on the front. Revisiting the make of the helmets to allow for wear with and without goggles would make strap position or sliding around of the helmet not a problem.
Yes. It is unnatural to load the extra weight on the front of your head. Reducing the weight of NVGs could improve this fact.
Yes. Lots of extra weight and a requirement to move your neck more for a good scan.
Yes. Main contributor for neck pain.
Yes. Moment arm and weight primary factors
Yes. Need to have weighted battery packs, across the fleet.
Yes. NVG counter-weights are insufficient to offset the moment arm created by the NVGs.
Yes. NVGs add extra weight on the neck and also have to be counterbalanced using the neck muscles. Additionally, when looking to the side, you have to lean way from the window, depending on your seat height, or else the NVGs will hit the window. When this lean has to be held for a time, it causes discomfort.
Yes. NVGs put additional weight on the forehead and cause additional strain to the neck. To counter this, additional weights were added to the back of the helmet. While this helps to balance the weight, it is still additional weight on the helmet and contributes to neck pain.
Yes. NVG's significantly increase neck pain.
Yes. Several times when I haven't gotten a pair of weighted goggles it has been a factor
Yes. The added weight (in addition to the vest) pull the pilot into more of a slouching position.
Yes. The additional weight on the helmet is significant enough
Yes. The battery pack counterweights that were available in HT's are not available in fleet squadrons.
Yes. The bottom of our NVG battery packs have little screws where you can attach counterweights. The civilians all have these and I have no idea why we don't. The counterweights are simple but effective.
Yes. The counterweights on the NVG's can help if they are installed for proper helmet balancing. However, the entire assembly gets very heavy after a long night of TERF'ing and can quickly cause neck soreness and fatigue.
Yes. The extra weight of the NVGs on the front and the battery pack on the back on disproportional thus adding stress to the neck in order to maintain a vigilant scan.
Yes. The extra weight causes muscle strain on the neck and upper back.
Yes. The extra weight undoubtedly contributes. Weights on the back balance the goggles, but add more weight to be supported by the back and neck.
Yes. The lack of counterweights puts an unnecessary strain on the necks of pilots.

yes. The neck pain is directly related to the NVGs. I can't say for sure whether or not horrendous posture contributes or not, but I do not get back pain, only neck pain, and I get it basically every time I wear goggles
Yes. The only command in which I had the option of using counterweights was HTs. Making counterweights more widely available would help.
Yes. The weight on the top of my head for long periods puts strain on my neck.
Yes. They are heavy and require a vigorous outside scan pattern (i.e. lots of upper body movement). Again, the glare shield is in the way, especially in a nose up attitude that occurs primarily when landing or in a terminal environment (e.g. VERTREP pick/drop, tactical landing).
yes. they do. by reason, the added weight to one's head will cause neck pain unless the individual's neck muscles trained to it through frequent use or other exercise. its a physical function of muscles.
Yes. This can be lessened with the weighted battery packs though. This is a simple, inexpensive solution that should be standard issue.
Yes. Too bulky and heavy. It's time for a HUD/Visor version with better FOV and much, much lighter. It's bulk and outward design makes it difficult to move head in cockpit and trouble shoot in the dark.
Yes. Without perfect fit they produce an added strain, especially during long flights.
Yes. You've got an extra four pounds on a six inch moment arm on your head. It's going to cause issues.
Yes. 5-10 pounds (helmet included) on your head 3 hours at a time is not good for your neck
Yes. A better counter weight system is required.
yes. counter-weights might help
Yes. Extra weight on the head, with non-organic NVD lighting.
yes. heavy, mass imbalance, interference with other objects in the cockpit, NVG HUD is ridiculous
Yes. However, if counterweights were readily available to all helicopter squadrons the weight would be better centered on the head and cause less strain on the neck.
YES. However, this can be mitigated or drastically reduced through the issue of quality helmet liners such as Zeta or other quality. Additionally, NVGs should have the option of battery pack weights which counteract the NVD weighting on the front of your head to ultimately balance the NVG system. These 2 aid in the prevention of neck pain. After about 4 hours, though, pain on the front of your head and neck start to show again.
Yes. I believe they are the contributing factor for neck pain.
Yes. I think a larger field of view would contribute to lessening the effects.
Yes. My neck pain is a direct result of NVG use.
Yes. Need to have NVG battery pack weights to help counter the weight of the goggles. They were available in flight school, but not in my fleet squadron. They helped a lot.
Yes. The Navy solution to NVGs not staying in position is adding more weight to your helmet. The better solution would be a better helmet liner or helmet.

Yes. They are heavy and cumbersome. It's not necessarily them that contribute to pain, but the length of time we are wearing them.
yes. They are simply too heavy
Yes. When wearing NVGs, the battery pack takes up more space behind my head which results in less room between my head and the circuit breaker panel which results in MORE helicopter hunch.
Yes... Neck if any
Yes...not to mention headaches.
yes--more weight putting strain on the neck

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## APPENDIX J. SUMMARY OF MEDICAL CONCERNS

From question 50 of the survey, “Do you have any medical concerns regarding your back and/or neck as a result of flying helicopters?” the following appendix was created. The comments were slightly edited for typographical errors and misspellings. Comments were selected if feedback could be beneficial for NAVAIR engineers and/or decision makers of the NAVAIR Community.

Absolutely, I have lower back problems on a constant basis as a result of flying
Absolutely. I believe that the long-term effects of flying helicopters will be present more in the future when I am out of my 20s. I want to be able to roll on the ground and play with my children and I do believe that my ability to do that could be reduced as a result of the seats and cushions provided.
Absolutely. I'm only 32, I work out 4 times per week with a focus on aerobic and core strength, and I sometimes have back pain that make it uncomfortable to get out of bed in the morning. It isn't severe enough to interfere with my life or flying duties right now, but I'm concerned with my quality of life at 40, 50, 60, etc.
After a career of flying, I do have concerns from the 'helo hunch' and its effects on my back.
AFTER FLYING PAIN SHOOTS DOWN FROM NECK TO LEFT ARM AND BOTH PINKY AND RING FINGERS TINGLE AND SOMETIMES BECOME NUMB.
After speaking with more seasoned aviators, I'm pretty sure I'll get some kind of back pain from flying around in the Starboard D for 6 hours.
am worried about my back and neck, primarily due to helo hunch and NVD flying.
As mentioned before, I am consigned to a life of yoga or similar routine to maintain a pain free life.
Back discomfort, no pain.
Back pain is unavoidable given the long term wear of 18 years of helicopter flying, preflighting (torquing body over / under rotors), etc. Lower back pain is a fact of life that you learn to live with. You just have to minimize it with stretching and massage (when available).
Back: My major concern is long term and what happens as I get older with the back pain I got from flying.
Better availability of additional seat cushions.
Certainly, I have no doubt that helicopter flying has contributed to a reduced quality of life because of lower back issues
Chronic lower back pain.
Chronic upper back and neck pain
Concern for longtime effects that will be felt long after my flying career.
Concern over the long term effects. However, nothing at the present time.
Concerned about long term medical conditions that will appear after career is over.
concerned about long-term effects, when older.

Concerned about the long term effects regarding my neck pain.
Concerned that over time I will develop chronic back pain due to flying in a helicopter.
Cumulative back pain leading to permanent damage.
Definitely. I'm afraid I've already done irreversible damage. My posture is horrible, and I have really bad back and neck pain and headaches almost constantly.
Developing arthritis in my back.
Diagnosed with complete degradation of two discs in Cervical Spine (in a row). Spinal surgeon recommended surgery. Surgery would disqualify from further flight.
eventually, I would be concerned about long-term damage.
Every month or so, the pressure builds up in my back and neck and usually end up trying to get a massage to work out the pain. I had a flight on deployment where I was unable to turn my head to the left due to neck pain so I flew left seat to enable me to see inside the cockpit in the event of an emergency. I was unable to clear the left side of the aircraft without turning my whole torso, so we put a second crewman on the left side.
Find that my posture is not very good, that is probably due to the flying.
Future back problems
Have a recently discovered curve in my spine. Unknown if it flight related. Persistent mild lower back pain, don't know if it will affect me in the future.
Herniated disc, L5-S1. Lower back strains. Mid-back pain due to misalignment.
How bad will it be 10 years from now?
Hunched back and constant back twinge.
I am concerned about back problems down the road due to helo hunch.
I am concerned about long-term back and neck problems--perhaps not caused by flying, but exacerbated by them
I am concerned about lower back pain as I attribute this entirely to my current occupation. I believe my neck pain was pre-existent to aviation career though compounded by flight experience.
I am concerned about the long-term effects of posture, vibration and ergonomics on my back health.
I am concerned it will get worse and affect me long term
I am concerned my lower back pain will not go away and will start affecting my life more and more.
I am concerned that I could obtain long-term back problems/damage as a result of numerous years of flying helicopters.
I am concerned that I will have chronic back pain after my flying career is over.
I am concerned that irreparable damage will be done.
I am concerned that my lower back pain will increase significantly the more time and hours I spend in the helicopter the way it is designed now.
I am concerned that over the course of my career, I'll probably develop chronic back pain. I don't see there's much I can do about it other than quit.
I am concerned that the constant strain on my back will eventually lead to a disability, and life-long pain.
I am concerned with a bad back due to poor posture in the cockpit. It is hard to maintain correct posture in the aircraft due to survival gear and the seat design.
I am concerned with the long term affects of dealing with habitual back pain. I am able to deal with it in the short term, but I do not want it to impact me later in life.



I am no longer able to run without severe back pain that I attribute to the helo crouch posture of sitting in the aircraft.
I am prone to lower back pain. I don't know if flying helicopters has caused it or merely exacerbated it.
I believe that I will have lasting back pain after my service.
I can only assume that the pain will get worse with age and more flight hours
I carry Aspirin on every flight in case my back starts hurting. As long as its not too bad, pain killers do the trick
I do have concerns when I get older that I may have some back issues.
I expect over a long time this could be bad.
I fear that I have developed serious back pain issues at a young age due to my flying.
I fear that in the long term, it will only get worse. I haven't given it much thought though.
I feel like I might have long lasting pain in my back and neck from flying helos in the navy.
I feel like I will have severe back pain when I am older and it will be directly related to the fact that I fly helicopters
I feel like long term I will have back pain, and that it is seen as typical for helicopter pilots.
I feel that even with good posture out of the cockpit, the posture assumed while flying negatively impacts the muscular or skeletal strength of my back. I've only been flying for a few years and am still pretty young, but I feel there are long term effects that will come from long hours logged in the "Helo Hunch."
I had Anterior Cervical Disc Fusion of C6-C7 neck vertebrae. Although the doctors could not say what caused the original condition, they didn't rule out effects of flying.
I have been to therapists, orthopedists and had imaging studies done and no one can give me a definitive diagnosis of cause of pain. MRI findings do not correlate to my pain. I think there is a muscular/ soft tissue solution to this that military health care providers do not seek out.
I have concerns about the future and whether or not I will have long term consequences from flying helos.
I have concerns if there will be long term effects on my lower back.
I have felt pain in my knees following long flights with back pain
I have long term concerns about my back. It's not an issue now, but I can tell it's being negatively impacted.
I have long term concerns that I might have serious back issues as I get older
I have mild concerns long term. I get sore after a flight and it goes away. I do think in the short term though, the more comfortable a pilot is, the better SA he/she will have.
I have never had back problems until very recently. I am 27 years old and my lower back seems to be less resilient than before helicopter training.
I have seen many pilots nurse their way through their last flying tour just so they could remain useful to the squadron. I do not want to retire just so I can have back problems and substandard healthcare.
I have significantly less endurance for daily activities due to back pain as a result of flying the TH-57.
I have two bad discs (one herniated, one ruptured) from flying helicopters
I just assumed I'd have a "bad back" as a result of flying helos for an extended period of time. I do think it is bad for my posture long term.

I know my back was impacted by 2600+ hours of helo flight time. I am concerned that as I get older, if I'm not very careful about exercise, my back will cause further problems.
I love to fly helicopters but it concerns me that they could make me a hunched up old man in my later years.
I often have a difficult time getting out of bed in the morning, going from lying to sitting, sitting to lying, or rolling over due to back pain. I can't drive in a car for longer than about an hour without significant back pain.
I routinely have lower back pain that I believe was caused by improper posture required for flying helicopters. Even when not flying regularly, I experience regular stiffness in the lower back
I think I have generally accepted the fact that my posture is worse, and deteriorating. I know several aircrewmembers who have had slipped discs and have had MAJOR surgery to correct this, and I imagine its only a matter of time before we see that in the pilot community.
I think I'll have future back issues
I think it makes recovering from a back injury a lot harder than if you were not flying, the Helo hunch and NVG pack are always putting strain on your back.
I think my back will get better once I stop flying.
I think that the bad posture of the helo hunch over time could be bad for your back
I think we should be allowed to see a chiropractor on a regular basis. We shouldn't have to deal with the pain.
I was downed for 4 months because I was diagnosed with migraines (I had a constant headache for 2 weeks that eventually drove me to the flight surgeon. It would not go away with anything over the counter or pain management injections). During my "down time" I went to see a chiropractor. Immediately following the appointment, the headache went away. I have continued to see the chiropractor. I have not used my migraine medicine (the doctor said that was ok) for two years and I have not had one headache.
I will use a civilian chiropractor to put off alerting a flight surgeon about my problems until such time as I believe that continuing to fly will cause irreversible damage, and then I will alert medical. Until then, I believe I have several years of good flying ahead of me.
I worry that I might have problems later on in life because of the poor posture I have to fly with for extended periods.
I worry that I will suffer from back pain for the rest of my life
I worry that I'll suffer from permanent discomfort at a young age.
I'm afraid that long term flying helicopters I'll end up with a shitty back
I'm concerned about my deteriorating posture over time
I'm concerned I'll have chronic back pain when I get older and after I get out of the Navy.
I'm concerned that I'll be a crippled old man before I get old.
I'm concerned that my back will be a source of pain for the rest of my life and the Navy does not adequately address the problem.
I'm convinced that I will have back pain for the rest of my life and will probably need a cane when I get older. I am concerned that I cannot play with my children without having pain.

I'm hoping that it goes away once I switch to a non-flying tour. If it doesn't go away, then yes, my concern is that I'll have pain/discomfort the rest of my life.
I'm more concerned with my back in the long term. I can feel my posture in every day life suffering because of my need to hunch over to get a good look at the instruments. Bigger MDs/FDs or larger instruments may help alleviate this problem
I'm not too worried about neck problems, but that seems to be an H-60 aircrewmen concern. I do have a concern about long term lower back issues as a result of flying helos.
I'm only 28 and I'm worried that the back pain I experience in the helicopter will cause long term back problems.
In the last 2 years I have been developing a sciatic nerve pain, or deep pain, that runs down my lower back through my buttocks.
It hurts.
I've noted back pain from long flights in most of my annual physicals over the past 7 years. I haven't flown many long durations flights in the past 5 years so, not much back pain associated. I would pursue a chiropractor through the military if/when it does persist.
I've thought about the long term effects, but no major concerns.
Just concerns for future health and mobility after the Navy.
Just future repercussions
Just I know my back has gotten significantly worse over the last 10 years.
just that my back is in constant pain.
Just worried about long term affects.
Just worried about the long term effects of dealing with mild pain over an extended period of time
Long term affects of back pain.
Long term affects.
Long term back health is a concern
Long term back problems due to posture...For me right now I know that it comes more after the long flights at sea or the double bags...it helps if I get out and stretch
Long term concerns. No concerns while I'm young but you have to figure this is degenerative.
Long term damage to the lower back
Long term effects i.e. future arthritis
Long term effects of vibrations and seat comfort on the back.
Long term effects once I am older.
Long term effects.
Long term I don't want to be disabled
long term occurrence of back pain following flight concerns me for lasting effects
Long term yes. I've known retired guys with bad problems.
lower back and neck pain
Lower back pain Sciatica Slipped disc (L5-S1)
Maybe, since I've acquired my own padding the back issues have decreased. If I ever go back to flying without aftermarket padding, my back is probably gonna be screwed.

Mild low back pain.
Mitigated through routine chiropractic care.
Moderate back pain
My back and neck usually do not hurt during the flight. However, the real discomfort for me comes from sitting on the hard seats and the leg straps from my airsave vest. After three hours the seat becomes very uncomfortable and I have to shift around in the seat due to my butt hurting.
My back hurts in and out of the cockpit now. It is becoming a chronic condition
My back is in some form of discomfort most of the day, especially after I fly.
My lower back and neck can tighten up and become mildly painful if slept on wrong or after long flights in the aircraft. The hunch that develops while flying doesn't help and the pull of the survival vest on the shoulders causes some discomfort.
My neck pain
My only concern is my on-wing instructor had severe back problems during advanced phase. He walked with a hunch and took medication for it. Was hoping that doesn't happen to more people.
My posture has definitely worsened since I began flying helicopters. I slouch much more now than I did beforehand.
My posture is awful and I frequently have twinges in my back that I didn't used to have.
my posture is terrible and my back hurts.
My required posture in the helicopter does make me concerned for potential back problems in the future.
No, I think that I will continue to adapt to it and it will eventually go away.
No, only the numbness in my feet.
No...just that my back is sometimes sore after long flights...probably just my age (40) and over 3200 hours in the H-60
Not immediate concerns, but have a feeling I'll have severe back issues when I get older.
not sure how I will feel in about 20-30 years. concerned that I have done irreversible damage to my back at this point.
Not that I know of. The massage lady always spends a lot of time on my neck and asks me sometimes if I have ever injured my neck before? I never have...
Not yet. So far it only goes as far as a mild pain/discomfort that usually is gone a within a few hours of completing the event.
Nothing chronic at this time.
Nothing long term
NVG's cause severe neck pain.
Occasional stiffness.
One of the questions asked if we had pain immediately after a flight. My pain usually starts in the neck, and nerves in upper part of back and neck about a day after heavy flying. I believe it is the survival vest creating the pain and not the seat. Seemed to get worse with age.
only mild concerns. It would be awful to end up with a permanent back condition
periodically, I am unable to participate in sports, i.e., football, basketball...
Permanent back pain.
Permanent disability and spinal compression from cockpit time.
Persistent lower back ache. Sharp upper back (right shoulder) burn after long flights

POSSIBLE PERMANENT HELO HUNCH. BACK PAIN LATER IN LIFE.
Precedence shows and my occasional experiences would dictate that prolonged helo flying will permanently affect your back and neck.
Regular lower back discomfort.
Sciatic nerve issues - not necessarily directly attributed to flying
Severe muscle spasms relatively easily aggravated.
severely degraded posture.
Since flying helicopters, my back has "gone out" about 10 times, resulting in periods of no flying and general difficulty moving around. This has happened on multiple deployments. This condition is expected to continue long after I am done flying.
Since flying helos I have had an MRI which resulted in finding out that I have narrowing of the L4-L5 and L5-S1 along with a slight bulge in the L4-L5
Sleep deprivation when the pain is at its worst. I take 800mg Motrin more than I should before I go to bed at night or sometimes during the night if I didn't take it before bed.
Some concern about having a bad back when I get older.
Sometimes my arm gets tingly because of the mid-back pain... it feels as though there is a pinched nerve or something. My back continues to hurt even when out of the cockpit.
That it will only get worse over time and I will have to deal with chronic pain after my time with the navy
That this pain will not get any better once I leave the airframe from flying.
The H-60 has been better, but I am concerned that if I fly the TH-57 for any length of time my back pain will come back
The long term damage to my back and neck will be a constant reminder of my occupation during my military service.
The possibility of chronic back problems later on.
The possibility of future disability
The symptoms will most likely increase with further flying.
There is no doubt that flying helicopters has led to my having almost constant back discomfort.
Three times during my career I have been downed due to back issues. Each time I have been unable to stand up straight and my mobility and normal daily functions severely impaired. I have been to chiropractors, physical therapists, massage, therapists and numerous doctors. I have been given pain killers and muscle relaxants. A recent MRI showed a herniated disc and bulging disc and have been told that surgery is the only choice to fix these permanently. I have delayed surgery as I am still functioning, but will ultimately need it to improve my quality of life. I see this issue as pay me now or pay me later - make the investment to improve the ergonomics of the helo seats or pay for disabilities upon retirement.
Two years ago I was downed due to a severely herniated disc (C6-C7). Symptoms went from mild irritation to incapacitating over a period of four weeks resulting in complete loss of use of my right arm. The only relief came with an anterior discectomy and fusion surgery. I was down for 8 months after the surgery and am now back flying. Total 60 time was about 1400 hours at the time of surgery. I believe the disc deterioration was a direct result of being a helicopter pilot.
Upper and lower back tension.
Whatever pain there is just the new normal for me. You just deal with it.

While the source of my back injury was not from flying, I believe the heavy level of flying that I have done has contributed
With almost 2000 rotary wing hours, I worry about my long term back health.
Worried about permanent back pain in the future.
worried my posture will suffer and affect me as I get older
yes - I'm sure this will affect me when I'm older but what can I do.
Yes - long-term degradatory effects.
Yes - when flying 3-4 times per week (avg 3-3.5hr flights), experience almost constant dull back pain (2-3 on pain scale). Has gotten worse the more I've flown.
Yes I worry about long term back pain.
Yes its very uncomfortable to fly and even now when I am not flying the back pain is still remaining.
Yes that this will stay with me and get worse as time goes on.
Yes! I have trouble touching my toes due to back pain. It is a challenge to tie my shoes in the morning. Gets better throughout the day as I loosen up, but still have pain. Also, on days that I fly, an increase in the level of pain occurs immediately following the flight and continues even until I go to bed.
Yes, I feel that flying helicopters increases the pain that I feel in my back and has caused back
Yes, my back and neck are always sore.
Yes, after enough time in the cockpit I'm sure I will have some issues.
Yes, an instructor of mine in the HT's had several slipped disks requiring surgery.
Yes, as the years go on I can see the mild back / neck pain I have now progress to something more serious due to poor posture and helicopter ergonomics.
Yes, at this point in my life I suffer from mild to moderate back almost daily.
yes, back compression and posture issues when I get older
Yes, back pain could be a good source of distraction during flight. it usually goes away a few hours after flight. there is not much that medical can do for me.
Yes, beyond the frustration of almost always being sore, I wonder about the long-term effects and results in later life.
Yes, bulging disk and torn disk in lower back (L4-L5 and L5-S1) which do not necessarily ever heal. I was treated with chiropractic, physical therapy, pain relievers, down period, etc. I still have pain even if I'm not flying now.
Yes, but at least it seems to go away once I stop flying
YES, Continuing to fly might make back pain worse.
yes, fingers going numb from neck/disk issues
Yes, I am concerned about long term damage to my back and neck due to poor ergonomics.
Yes, I believe later on in my career flying helicopters will have a large affect on my back and neck
yes, I believe that I will have back pain issues for my entire life and believe them to be directly the result of flying helicopters.
Yes, I fear I have already damaged my spine to the point of being permanently subject to back pain.
Yes, I feel that I might have worse posture from flying and have back problems later in life.
yes, I have back pain daily

Yes, I have been diagnosed with disk degeneration probably triggered by the vibrations of the aircraft. I work hard to build back muscle to compensate and hopefully give me a productive career.
yes, I have Grade I Spondylolesthesis/loliasys. It is a permanent condition. I will always have to be careful with my lower back. I am restricted from certain movements and some activities. Additionally, I can hear the bones grinding in my neck when I turn my head. I've seen the x-rays and my neck is straight, there is no natural curve left.
Yes, I have long-term concerns about the health of my spine/posture as a result of flying.
Yes, I have some long term back concerns.
Yes, I think flying helos causes back pain in most people, specifically those that are susceptible b/c of a herniated disc.
yes, I think I'll live with pain forever. I get temporary relief from the chiropractor, but the pain always comes back.
Yes, I think the helo hunch will cause back problems over time.
yes, I worry about long term effects due to the vibrations and the "hunch" that I don't notice yet because I am still "young" I do worry about what type of affect it may have on the joints/cartilage that I won't know about till later in life.
Yes, I worry about my long term back health and ability to do things after my flying career is over
Yes, I'm concerned my back is worn out and will always have pain.
Yes, I'm sure it will continue to get worse.
yes, I'm worried it will get worse
Yes, I've heard many people talk about it and with an active live style would hate for my career to impact my personal life and health
yes, long term affects to posture and pain down the road
Yes, long term back pain.
Yes, Long term effects because of poor/insufficient seating.
yes, long term lower back pain
Yes, many concerns. I can't exercise a lot of the time because my back is too sore and sometimes I don't have full range of motion in my neck to turn my head because its too sore after flying.
Yes, my medical concern is that I have a slipped or impacted disc in my spine.
yes, my neck is an issue
Yes, my neck is constantly sore most likely due to the weight of the helmet and NVGs. The seats need better padding and the new Block III aircraft have a more upright co-pilot seat which is very uncomfortable.
Yes, my shoulder and neck have permanent damage.
Yes, permanent spinal injury / disc rupture
Yes, see my previous answers. I have injured my lower back twice in the past two years. Each time I was doing basic every day activities. I believe my lower back has weakened over time in the cockpit and was a major contributing factor to my injuries and "down" time.
YES, THE SEATS ARE POORLY DESIGNED. USE THE STRAPS TO FORCE MYSELF IN THE UPRIGHT POSITION. I USED A BACK SUPPORT THAT WAS ISSUED FROM NAVY MEDICAL, BUT WAS LATER TOLD THAT THEY ARE NOT ALLOWED IN THE AIRCRAFT.

Yes, worried about having back pain for the rest of my life as I age.
Yes, would like for pain to go away.
Yes, years of poor posture due to vest and seat design I believe have led to a lower back that is more susceptible to injury.
Yes, I spent two years throwing my back out and getting downed to take muscle relaxants, and pain killers. I was sent to a chiropractor without X-rays, which only caused more pain. The answer I got was always "it's muscular from flying helos." Flight docs did not ever order any sort of test. Finally this fall, a different, non aviation base, saw me when my back was thrown out and scheduled me for x-rays and MRI's. Turned out I have one bulging disk and one herniated disk. I will most likely need surgery, that could have possibly been avoided if the cause had been found before it got worse.
Yes. As I have gotten older, I get back pain from activities I didn't use to such as running or playing basketball.
Yes. As someone who has experienced back pain in the past, I feel that my situation has worsened since beginning my career as a Naval helicopter pilot. The seats are antiquated and offer almost zero support for the back.
Yes. Back problems run in my family and my current profession appears to be accelerating what is already a family tendency toward lower back issues.
Yes. Concerned about long term issues.
Yes. Had surgery to fix ruptured disk. It helped, but continued flying aggravates the condition.
Yes. I find that it is now an effort to stand or sit straight, especially after a flight.
Yes. I'm concerned about my spinal health and posture as I get older. I do stretches and yoga to try to mitigate the effects.
Yes. I've gone through 6+ months of physical therapy with no improvement seen. My condition is chronic and permanent. I will likely have to endure chronic pain for the rest of my life.
Yes. My upper and lower back hurt constantly, especially during and after flying.
Yes. Numbness after flights and soreness more often than normal in the mornings.
Yes. Can't carry things on my back (vest) without back tightening to point where I can't move my neck, swivel my head.
Yes. I'm certain it's bad for me, but I love to fly. Otherwise I would have quit by now.
yes. lingering back pain after my flying career is over
Yes. Long term spinal problems concern me.
Yes. Outside doctor and x-rays show I have a herniated disk. I opted to be put on a machine that expands your spine 5-6 times and it seems to help a little bit. The pain comes back though.
Yes. Why don't squadrons have a chiropractor. We could even get one for multiple squadrons. I've been going to one since shore duty and it has done wonders for my posture and overall well-being.
yes....that the pain will continue
Yes...don't want to be disabled when I get out of the Navy or have chronic back pain for the rest of my life
Yes; the long term repercussions of the pain and what kind of damage I'm doing to my back.



## APPENDIX K. SUMMARY OF FACTORS INFLUENCING BACK PAIN

From question 26 of the survey, “Any other comments or observations about back and/or neck pain and factors that influence it?” the following appendix was created. The comments were slightly edited for typographical errors and misspellings. Comments were selected if feedback could be beneficial for NAVAIR engineers and/or decision makers of the NAVAIR Community.

A counterweight on the helmet would help with NVG weight balance.
According to my doctor, aircraft vibrations coupled with a poor seat design are likely to blame for two herniated discs.
After a long flights, I also have significant pain in my tailbone.
After long VERTREP evolutions, I would experience neck pain and sharp pain behind my right shoulder in the middle of my upper back. After moderate to long flights I would experience chronic lower back pain. It is worth saying that the seat we used in the H-46 during the 1990's was of a poorer design than the one currently in use.
Aircraft seat cushion almost totally flat. No support was felt.
Amount of pain correlates to amount of time in the helicopter.
Amount of pain is directly proportional to length of flight time.
Another factor is a fit of the vest. I have a small frame, so the vest fits loosely. The combination of a loose vest hanging down and lack of back support can be painful.
As an MH-53E Pilot, I routinely fly 10 degrees nose down with the ball completely displaced, putting my upper body in a very uncomfortable position.
Back and neck pain occur regardless of the type of flight. It really comes down to two things, length of flight and NVG usage. Rotary wing pilots routinely accept flights longer than 3 hours. 3 hours strapped into a vibrating seat with 10 pounds on your head is going to cause pain. If the flight gets really long (4.5 hours+), my sciatic nerve will become intensely painful.
Back is tight after longer bags or double bags...pain is not continuous after every flight...it only happens after the longer flights
Back pain can make climbing into and out of the aircraft more difficult. Additionally, I can see how this make an emergency egress more difficult in the event of an emergency.
Back pain is likely due to a combination of a poor seat and bad posture. Neck pain due to NVG weight on the front, which would likely be mitigated by balance weights on battery pack.
Back pain is not limited to helicopter flying. When I was a T-34C flight instructor I had a lot of back pain too.
Back pain is usually associated with longer flights (4-5 hours+) Neck pain usually associated with all NVG flights and longer flights

Back pain occurs on almost every flight, regardless of the profile because of the "helo hunch" and sitting in one position for long periods of time.
Back pain occurs on flights over several hours. Neck pain occurs on flights over 3 hours or on many flights with NVGs. Weighted NVGs and a better helmet liner have helped. I only received a better liner, previously have bubble wrap for 8 years, after stating that I will not fly again until I have a better liner. That along with rank got me a better liner, not because everyone needs a better liner.
CLASS A IMPACT ~15G's. THE OTHERS ARE JUST NORMAL NVG FLIGHTS... REALLY KINKS THE NECK!
Comes after a few hours flying, usually more than 2.
Constantly sit hunched over in the seat just due to control locations and seat configuration
Cramped space in the cockpit and no padding in the MH-53 seat.
Cushion support is less than sufficient and being a larger pilot I cannot use a supplemental seat cushion and still have room in the aircraft to fit comfortably. As to back/neck pain, I am unable to adjust the seat in order to sit comfortably without experiencing some dull pain during all flight regimes.
Do to the seat not going far enough back causes me to have to hunch over the cyclic in order to see the screens and look out
Double bagging contributes to back soreness/pain due to lack of padding and lumbar support. Goggle flights contribute to neck pain, no counterweights with our goggles make it worse. Instrument flight, I find myself hunching over to concentrate on the instruments.
Double bags 6+ hours often bring the hurt!
Due to inability to adjust the TH-57 seat and minimal head room I was unable to sit with a straight back while flying.
Duration of flight.
Every time I use NVGs with the counterweights, it greatly reduces the neck fatigue.
Experiencing some spinal compression after flights.
Flight duration and frequency are the primary factors for me. Anything flight more than 4 hrs and any 30 day period more than about 25 hrs.
flying 2 flights per day over consecutive days makes it hurt more
Flying Instruments seems to be the worst back pain because I hunch over
Flying with my back straight, i.e. good posture, makes it difficult if not impossible to manipulate all controls and switches effectively. I find that most pilots have to hunch over for the duration of the flight.
For me it all hinges on length of flight and if the lumbar support holds air. If I have good lumbar support then I can fly multiple 4 hour plus flights with no problem. I flew four 4.5hr flights in four days in aircraft with good lumbar support and I was fine. However, a 3.0 in a aircraft with bad lumbar support will cause mid and lower back pain. It always goes away right after the flight when I can stretch.
For previous question - most severe back pain occurred while wearing airspace vest with body armor and NVGs. Have not worn body armor with new desert vest
General Fatigue after double bags is common. Sore Neck and lower back is routine

General seating position of the SH-60B is uncomfortable
general soreness, could be alleviated by a better seat cushion.
Generally, we as helo pilots, slouch down in the seats in order to get positioned for manipulating the controls. This position is key to lumbar distress.
Goggles definitely lead to neck pain for long flights
H60H seats are significantly worse than others
Happens regularly on longer bags
Haven't experienced the back pain in the MH-60S due to the shorter lengths of the flights. F/H series was much easier to get to the point of back/neck pain on the longer 3 hr night events with NVG's.
head to close to back circuit panel
Helo hunch posture is the primary cause of my mechanical lower back pain. Frontal leaning weight of the survival vest exacerbates the already poor posture when manipulating helo flight controls.
Helo hunch, increased vibrations.
helo-hunch isn't fake
Hunching over in order to reach all controls sucks. I've started seeing a chiropractor to keep my alignment!
I also experience pain/numbness in the back part of my upper legs after a long (greater than 2 hours) flight
I am currently in very good shape including strength and flexibility so physical fitness is not an issue/cause for back pain
I believe counter weights for the NVGs would help.
I believe I get back pain from the seat position and how we have to hunch over the entire flight in order to fly.
I believe my lower back has gradually been weakened over time due to flying helicopters and sitting in positions in the aircraft that hurt the back. I am afraid that I will have long term trouble with my lower back due to flying helicopters as evidenced by my two separate injuries in the last two years.
I believe that the hunched posture required to comfortably grasp the collective and cyclic is a significant contributor to the pain.
I cannot match back pain with specific mission sets. More with time in the chair. Anything more than about 3 hours and my back starts to hurt. I feel myself trying to move around more and unlocking the harness to try and stretch more often.
I can reach/bottom the collective but in order to do that I have to slouch and sacrifice part of my view over the dash. I spend the majority of my flights slouching in order to be able to anchor my elbows on my legs while I fly.
I commonly have lower neck pain, but it may be a result of side sleeping. It has become more frequent the last two years.

I experience middle to lower back pain every night when I sleep. At some point during the night my back seems to tighten up and it is very uncomfortable sometimes to the point where I will just get up even if it is 3-4 in the morning. This carries over to the daytime as well and I find that when I sit too much or stand too much one or the other throughout the day that will make it worse.
I experience neck pain (short term) from wearing NVGs. So far it is pain that goes away soon after the NVGs are taken off.
I feel that the back of the seat is too vertical.
I feel the goggles have made a serious situation with my neck. The H-3 gave me a great deal of issues with my lower back...the h60 is better. But the goggles have created "butt" issues...basically, my bones are getting smashed, creating nerve issues in my legs.
I find that to comfortably be tactically using the keyset and the displays, that I tend to lean forward to type and manipulate the keyset. The weight of the vest almost forces you into a hunch, because all the weight is concentrated in the chest area, and the straps pull forward. Worst on longer flights. Also may want to tie in knee pain.
I found that lumbar pads carried into the aircraft reduced the amount of Sciatic pain I received. The inflation style lumbar is poorly placed into the lowest part of the seat, not the lower back.
I have a significant amount of back pain in specific spots of my back, the pain is definitely agitated the most following any flight, and gets worse the longer the flight was.
I have a tendency to hunch forward while flying.
I have to raise my seat to see over the dash since it is too high. Because of this, I sit high enough that now my view is obstructed by the upper limit of the windscreen. So to see a normal view in front of me, I need to hunch forward to see over the dash and under the upper end of the windscreen.
I know it's the straps because that's the only time I feel the pain. the connection point on the straps is too low. if they made it higher it would probably not affect me. To be strapped in tight, I am forced to be slightly hunched over. Also keep in mind that I'm only 5'7" so I can only imagine what the tall guys go through.
I must slouch to reach the controls and the survival gear weighs my shoulders down also causing slouching and back pain.
I personally had back pain that manifested itself in my left leg (sciatic nerve).

<p>I privately pay to see a civilian chiropractor, so I can avoid the flight surgeons. I was told that the x-rays showed I have lost approximately 40% of the curve in my neck, which causes the headaches and my upper back pain. After several adjustments and sessions of traction on my neck to help re-align it, and stretch the ligaments to try and put some of the curve back, my upper back pain was reduced by approximately 90% and the neck pain/headaches virtually disappeared. While on deployment, the constant use of NVDs without any sort of counterweights on the battery pack has caused these problems to reappear. One pilot in my squadron actually duct tapes padlocks to his battery pack as counterweights to avoid this problem. The lower back pain is caused by vibrations with lack of adequate padding, and the inflatable seat cushions that do not hold air (which is a problem augmented by the fact that half of the inflation valves are broken and no parts are available to replace them).</p>
<p>I tend to "hunch" more now, and need to actively think about my posture. I also find myself "cracking" my neck all day.</p>
<p>I think I had poor posture, combined with the vest and leaning over the controls - caused trigger spots behind my shoulder blades that would shoot pain up my neck</p>
<p>I think my back-related issues are a direct result of the aircraft seat shape and ergonomics. Neck pain is a result of the heavy NVG system that we use and it's made worse when the battery packs do not have counterweights installed.</p>
<p>I think the number one cause of my back pain is the conditions of the seat cushions themselves. They are typically very thin and the lumbar is squashed and deformed.</p>
<p>I think world class lumbar support is appropriate for helo pilots. What we have doesn't cut it. Long flights on NVGs are biggest contributor to my neck pain.</p>
<p>I understand that it is hard to get supplies out to the desert, but not getting a seat for three months is going to take a toll on the pilots. Even when the seat was working (inflating cushion and lumbar) we still had folks coming out of it with pain (including yours truly). A lot of that is due to the position we have to assume due to the NVD Battery pack (hunched forward) discussed earlier into the survey.</p>
<p>I was a crewman in 60's for 10 years prior to winging which more than likely help led to back and neck issues too.</p>
<p>I was in a mishap in 2004; neck pain began then. NVDs are now extremely difficult to use. Lower back pain has gotten consistently worse throughout the years and wearing flight gear during preflight and/ or just walking to the aircraft aggravates it.</p>
<p>If the seat is adjusted high enough to see over the glare shield I must hunch over because the back of my helmet hits the circuit breaker panel behind me. It is worse with the NVG battery pack on.</p>
<p>In all cases, NVGs make the neck pain portion worse. In one unit, we had the weighted NVG battery packs which helped a lot. These should be standard issue for all units.</p>
<p>In the H-60, the seat doesn't support our lumbar very well. The weight distribution associated with our flight gear is poor therefore my posture is negatively affected. The neck pain I have experienced has been more and more frequent as I accumulate more flight hours.</p>
<p>In the HH-60 the seats crowd your movements with the ballistic shield in place and the cushions are practically nonexistent.</p>

Inflating the lumbar support helps back pain a lot. It does move your feet further forward though which can cause knee discomfort
Insufficient padding and lumbar support that NEVER gets replaced when needed. Having a supplemental seat/lumbar cushion on an individual basis would be a plus.
Insufficient padding in the seats. The cushions are old and provide little to no support, especially lumbar support.
Insufficient seat padding, excessive gear, and uncomfortable seats all factor in to back pain and general discomfort in the aircraft; additionally, the crewmen seats in the back of the aircraft are exceedingly uncomfortable and distract crewmen from primary mission concerns.
It bothers me that the Navy has not purchased NVG counterweights to counter the heaviness of NVGs. The weights are inexpensive and easily applied to the bottom of the battery back as necessary. During Advanced Helicopter Flight Training I used the counterweights and naturally assumed the fleet would have them. However, no fleet squadron has the counterweights.
It is chronic at times. When my back starts hurting post-flight, it usually hurts for several weeks nonstop.
It is mostly lower back pain that results from the complete lack of an ergonomic seat. The lumbar supports are a joke. Make a seat that is shaped like the back, not flat!
It mostly seems to happen when there are primary night/NVD flights. My neck cramps up bad (I've seen the doc about it and just get muscle relaxers) but I cannot drive because I will be unable to turn my head to the left
It's as if slouching forward is almost required to maximize instrument scan, see over the dash, and keep my right elbow supported by my right knee. Additionally, the lack of lumbar support doesn't encourage me to correct my posture.
It's especially a problem on double or triple bags. Neck pain was just while my head was getting used to NVGs, especially on the small boy where I had to move my head around a lot.
I've actually found that flying with body armor can relieve the back pain, because it forces you to sit up straight. In the H-60F/H, the bottom of the seat is completely flat, so over the course of the flight you slide forward and start to hunch. I have flown the H-60S, which has a bucket style seat and it was a HUGE improvement. It supports better posture and it better matches the way you should naturally sit.
I've experience sharp back pain when landing the helicopter ashore and aboard ship. Our authorized rates of descent are 720FPM on level terrain, 360 on sloped terrain.
I've noticed most of my back comes from sitting on armored seats with little or no padding. Also all the gear that is worn and the way I have to sit to be able to look over the console contributes to the back pain.
I've noticed that I have constant residual back pain when I'm in the aircraft and when I'm sitting here in my cushy desk chair. I have constant neck pain, constant headaches and knots in the muscles of my back and neck.

I've noticed that stretching can help alleviate a lot of my lower back pain, but that once it starts it's hard to get under control without a few days off from flying because the more you fly the more in compounds. But generally it isn't an issue when flying just as an issue when you step out of the aircraft and are walking around. Also as a new pilot I would "stand on the pedals" which caused tremendous stress on my back. Weighted NVG's (our squadron just got them within the past 3 months) are awesome and definitely help with the neck pain. A flight with lots of fun maneuvers causes more pain.
lack of adequate lumbar support, combined with problems reaching collective/seeing over glare shield, am constantly in a "slouch" or "hunch" in order to reach all the controls.
Lack of lumbar support and improper fitment of none issued vests are the two biggest causes I've encountered
Lack of lumbar support contributes heavily to my back pain, which is why I use a supplemental cushion and support.
Legs and feet start to fall asleep due to pressure on back of legs at edge of seat. NVD's with weighted battery pack helps with balancing goggles but strains neck and causes long term neck and upper back pain
Length of flight and flying on instruments affects pain. I tend to lean into the instrument panel when using the MPD or flying on instruments.
Length of Flight...long flight = sore lower back
Length of time in the cockpit directly correlates to lower/middle back pain, in my experience. If I am in the aircraft over about 3.5 hours, the seat cushion becomes insufficient support. In the attempt to keep myself well positioned in the aircraft for lookout and flight instruments, I find my back getting progressively more tired/sore. For 8+ hour flights it can become quite severe (these were common in the Haiti relief effort). As time in cockpit increases, slouching to alleviate pressure on seat pan causes further back pain and general discomfort. I primarily experience neck pain only during extended NVG flights, usually due to having to keep the helmet cocked slightly forward so that the NVG battery case does not catch (thus immobilizing my head/scan until I can pop it free) on the seat structure immediately behind my head.
Location on the spine - mid back
Long duration flights Multiple flights in succession. Going back to NVD's after a period of not using them
Long flight with dynamic maneuvering
Long hours, especially during double bags puts strain on my lower back (sitting for 5-6 hours)
Long Prolong flights with NVDs adds to neck stiffness and upper back pain
Long story short... The Kevlar seats in the H-60 are uncomfortable.
Longer flights or double bags (2 flights in a row) have the most affect.
Longer flights, or flights on consecutive days would make it worse.
Lower and Upper-middle back due to twisted seating position due to collective and cyclic positions. Neck/upper back pain due extended NVD operations
Lower back pain seems to come from flights lasting longer than the normal 3-4 hours

Lower back pain with associated leg tingling/numbness
lumbar support being insufficient is the largest contributing factor for back pain, and not having NVG counter weights for neck pain
Lumbar support insufficient. There is a pad velcroed to the seat that is supposed to provide lower back support, but it is constantly falling to the bottom of the seat and doesn't provide much support.
Majority of seat cushions are deflated/flat within 30 minutes of flight time.
Many helo pilots see chiropractors outside of the Navy Medical System on a regular basis.
-MH-60S: Air bladders in seat cushions are positioned closer to the knee, not under the buttocks where they would do the most good. -I have the most flight time in the HH-1N (not listed, but similar to TH-57). When scheduled to fly 4-5 hrs/day, I was getting mid-back pain that was borderline incapacitating. (ONCE, I couldn't get out of bed.)
More of a soreness from the harness and only a small portion of my back touching the back of the seat.
More/better seat padding would help a lot, the older the seat is the worse the padding gets and the air bladders seem to always be broken.
mostly caused by reaching for collective. pain in the upper back (shoulder blade)
Mostly occurs when flying a double bag and the seat has a very worn cushion and/or little to no lumbar support.
Moving pedals further forward seems to help me keep better posture and shifts my sitting weight.
My back is forced to hunch forward with my helmet on. For say a 7 hr ship flight at the FRS, I am uncomfortable during and experience pain afterwards.
My back pain become an issue when I was an FRS instructor, after I had over 1000 hrs. In the FRS a standard 1.8 hr bag became almost unbearable. I started seeing a chiropractor at this point.
My back pain is not chronic, but after a long flight, I am spent. I think that more padding on the seats and better lumbar support would help out on flights over 4 hours.
My legs, in the hip joints, are frequently stiff after flights. This seems more common for me than back or neck issues.
My lower back pain is mostly related to the "helo hunch"; leaning forward at the waist to adequately maneuver the cyclic and maximize visibility. Any flight longer than 2 hours is when I start to experience back and buttocks pain (seat cushion alleviates buttocks pain).
My seat is almost at max height to see over the dash but I have to lean over to put the collective down. Causes pain between my shoulders.
My worst back pain was in the TH-57, I had back pain that continually got worse through flight school to the point I woke up every morning in pain, riding in the back seat during the instrument phase seemed to aggravate the condition
Natural position in helicopter is hunched over controls to allow full reach.
Neck pain specifically due to weight of NVD's and duration of flights.
Need to get weighted NVG batt packs to everyone.



Never serious pain, just general soreness after being in the aircraft for a while
No recline position of seats to alleviate stress.
NVD flights longer than 2 hours cause neck and back pain
NVDs strain the neck
NVGs are far too heavy. I could do it in the moment but always felt bad the day after. Sometimes I couldn't even move my head and was still required to fly, awful what we put ourselves through. But NVGs are invaluable at night especially around the boat--so helpful.
NVGs are heavy and even with the counterweights they hurt my neck. The seat "cushions" are inadequate, especially for lumbar support.
NVGs contribute to neck pain (I already hunch my shoulders somewhat when flying, putting my head forward of my cervical vertebrae and the weight of the NVGs exacerbates the strain). Another note on my answers to these questions: I *always* have back pain after a flight.
NVG's directly cause the neck pain and occasional headaches. The back pain comes from the poor lumbar support. It is even worse when the lumbar support gets worn to the point it knots up, because you can't even take it out of the aircraft without cutting it and it is a constant lump. It is very difficult to get replacement parts for low priority items like these when you are deployed on a small deck.
NVGs lead to neck pain. Poor seat cushion design/function lead to lower back/buttocks pain. Back pain compounded by poor shipboard mattresses during deployment.
NVGs seem to make back/neck pain much more likely, and much worse. NVGs are poorly balanced, with the majority of the weight on the front of the helmet, which means that you must constantly strain to keep your head level.
NVGs themselves haven't been a noticeable cause of 'pain' after flight but additional fatigue and stiffness results from constant adjustment and head movement.
NVG's too heavy causing neck pain
Often flying for two hours or more my lower back gets sore. The "lumbar support" is a small pad, more like a tube that I feel gets more in the way and doesn't do anything. When you're strapped in there is no way to stretch your back out and it becomes painful to the point it could be considered a distraction.
One torn disk and one fractured disk in my back due to continuous wear and tear, not certain incident (L4-L5, L5-S1).
Only occasional, seems to be random.
Our seat cushions are absolutely terrible. Way too thin.
Over the years I've noticed that prolonged sitting also aggravates my lower back pain.
Over this past flying tour my back pain has become nearly constant and especially troublesome after a flight lasting longer than 2 hours.
Pain first started occurring during a deployment. We were flying long missions, sometimes 7-9 hours. From then on, the pain would always return in the same place, even during shorter missions.
Pain is usually not an issue until after 3 hours

Part of my back always seems to get strained easily, feels like a pulled muscle, but not sure what causes it.
Poor posture while sitting lopsided (lean left with hand on collective), hunching over MPD, vibrations, no lumbar support, long flights without stretching, no counterweights for NVGs
Posture in aircraft is inherently slumped - usually with right arm supported on right leg (kneeboard) for fine cyclic control. Usually even worse when wearing goggles (and that's usually where the neck pain comes from - although, I've noticed it's not as bad when wearing the extra weights on the back of the helmet.
Pretty much steady sore back when flying regularly.
Probably due to length of flight
Real stiff and sore after flying 2 3.5 hr flights without getting out in between.
Reduce the weight of the survival gear and make it less bulky. Increase visibility in the cockpit to make scanning without leaning all over the place and straining you neck possible.
Right seat in the 60B has you leaning forward a lot to work the keypad and observe the mission displays
Right side just about at the rib cage. probably from reaching forward to manipulate the cyclic during a long flight
seat angle may cause more pain as well. is it possible or safe to have the seat recline
seat cushion inadequate. Butt bones dig into the seats making the pilot have to constantly shift around. I can no longer go a 4+ hr flight without getting out and walking around.
Seating posture to accommodate flight control inputs put pilots at a slight forward leaning position. Besides, vest and survival gears add some additional load that lower and mid back has to support over a duration flights.
Seats allow bad posture due to the fact there is no/insufficient lumbar support and too vertical of seat positioning
Seats have zero lumbar support and the angle of the seat coupled with the weight of the vest creates a hunched over flying position. This causes my lower back to throb on >2.0 hr missions.
Shifting around in the seat to accommodate back pain can cause inadvertent control inputs
shipboard landings, constant vibration, seat padding or lack thereof
slouching is another causal factor. When I maintain good posture, I have trouble aligning my wrist to the cyclic grip. The pain is more of soreness than pain.
Slumped posture over collective possibly influences onset of back pain. This posture could be due to the naval aviator themselves and/or ergonomics of the cockpit.

<p>Stretching hamstrings helps (tight hamstrings forces lower back to be even tighter when in the "helo hunch").</p> <p>The best ever therapy that I received was through a civilian organization called "Rehab United" (located in San Diego), that specializes in sports medicine. (My experience with back pain is pretty extensive...not only do I regularly deal with lower back strain, I also have dealt with a herniated disc, L5-S1, which occurred during a night TERF, that caused severe sciatic pain and downed me for 2.5 months.</p>
<p>Sustained lumbar flexion seems to exacerbate symptoms. I experience some relief after certain exercise but other exercise (sit ups/ running) increases pain.</p>
<p>TERRIBLE Lumbar support and TERRIBLE Cushioning! Terrible seat design.</p>
<p>The armor seat is not ergonomic with body armor. Many pilots from my command remove the back cushion during flights in order to avoid the 'helo hunch' with body armor. We are using the Eagle Vest, and I use both front and back SAPI plates in order to even out the weight.</p>
<p>the back pain generally starts in seat and thighs before working up to mid back</p>
<p>The back pain I experience after flights is all lower back, and it's independent of NVG use. My neck gets sore after anything over 4-5 hrs of NVG flight, but that's a separate issue.</p>
<p>The back pain usually coincides with numbness in my upper thighs.</p>
<p>The back pain was concentrated more towards my right should than centered on my back</p>
<p>The cockpit does not allow me to stretch in place to relieve cramped muscles. Thus, the longer I am in the cockpit at one time, the worse it tends to be.</p>
<p>The constant up down vibrations definitely increase the rate of pain developing. The longer times setting on deck generates more back pain then in flight.</p>
<p>The counter weights that they have for the NVGs has helped.</p>
<p>The gear contributes as structure of the seat. The general position in which helo pilots need to fly- hunched over to the left- so that they can always be on the collective is a main concern. Maybe moving the collective back would help and adding more cushion to the bottom of the back portion of the seat.</p>
<p>The hunching over caused by the inability to raise the collective when I raise my seat causes back pain.</p>
<p>The lack of ergonomics in the seat design and the poor design/performance of the built in padding in the H-60S make long flights (i.e. all day vertrep, etc.) very painful after 4 or more hours.</p>
<p>The lack of lumbar support in the 60B and 60R is directly related to my back pain. Due to the seats and the gear, you are forced to slump for half the flight and keep your back uncomfortably straight and rigid for the other half</p>
<p>The largest contributing factor to pain in the aircraft is the inability to stretch out my legs.</p>
<p>The length of the sortie is definitely a factor. If you're in the cockpit for 5-6 hours the effects will always be greater. If you have back pain after a 2 hour flight, you should not be flying.</p>

The longer the flight the worse the back pain. Flights over 3 hrs definitely contribute to the pain.
The lumbar support is often deformed and can often make problems worse with regard to lower back.
The lumbar support is terrible, and they won't replace it because the part number is linked to the whole seat cushion. So even if the butt pad and back are fine, you still have to pay to replace the whole thing. The design on the lumbar support is also really poor, only held in place on each side, so the motion of squeezing in and out of the seat pulls it out very quickly. Many double bags I would often put a PCL or Tacaid there for support, because that was all I could get.
The lumbar support, even when the pads are new, is very poor. I have to use an aftermarket lumbar pad and seat cushion to help alleviate any problems. If I fly without the pad, back pain sets on relatively quickly, with the pad I usually don't have any pain (except on exceptionally long flights, i.e., 4+ hours)
The main problem for me is that for the majority of the flight I am hunched forward and down to reach the controls. Controls are too far forward to reach if I lean back with my back straight against the seat. If I move my seat forward and down enough to make the control position comfortable, I lose my ability to see clearly over the dash and my knees rub the lower edge of the displays (even with the pedals full forward).
The padding provided in the SH-60 tends to wear the velcro and move during flight sometimes creating hard/hot spots. Additionally, some pads can twist in the lining and cannot be adjusted without busting the zipper.
the pain goes away after some stretching on deck
The poor seat cushions and constant vibrations. I never felt like I had adequate body support.
The position I must hold my body while flying has a natural tendency to induce back and neck pain. I tend to be hunched over. NVG use just adds more weight and makes my neck sore more quickly. The vibration of the helo exacerbates the problem already caused by body position/posture. I feel the back pain every flight, but it's a bit less if I do good stretching before and after the flight.
The seat cushions do not provide any support.
The seat design in the helicopter is bad. The necessity for a seat that strokes straight up and down is required for crash worthiness/survival, but directly impacts proper ergonomics. The lumbar support, or lack thereof is the primary culprit.
The seats are not supportive and holding the flight controls require your spine to be in an unnatural curve.
The seats are old and worn out, and never replaced.
the seats do not remain inflated, ever, and cause my legs to go to sleep on some flights because the lip of the seat cuts off circulation to my legs. Shifting around is okay for a while but past the 2-3 hour mark it is very uncomfortable.
The seats have little to no lumbar support. I end up swapping the controls multiple times during flights in order to lift myself off the seat and arch my back a little bit to stretch out the muscles.

<p>The seats in the 60 are too upright and do not provide adequate support. Oregon Aero makes replacement seat cushions that supposedly correct posture problems, however, although they are approved for use by the Army in their Blackhawks, NAVAIR has failed to approve them for use in our Seahawks. The lumbar bladders are a start but despite our aircraft being less than a year old, most do not stay inflated. Additionally when raising the seat enough to provide adequate visibility, my helmet hits the circuit breaker panel behind my head unless I hunch forward (this is the reason for my back and neck pain, and is greatly exacerbated when wearing goggles with the battery pack causing me to hunch even more). If the circuit breaker panel was relocated and more room allowed behind my head most pain would disappear or would be greatly reduced until longer flights. I am 71 inches tall which is average based on my observations.</p>
<p>The seats in the H-60 are terrible. Every time I fly, my lower and mid back hurt. I have flown 6 different kinds of aircraft and this is the only one that causes pain.</p>
<p>The sitting straight up causes me to slump my shoulder forward. Some recline to the seat would probably help to alleviate some of my problems. Lighter more compact NVGs would also be great.</p>
<p>The standard "Helo Hunch" is one of the main problems, the seats need to be low to see gauges under the glare shield (which are falling down) and yet be high enough to stroke in an emergency. When body armor and combat sortie lengths are increased, back problems continue to increase.</p>
<p>The survival vest causes me to hunch over in the aircraft due to weight. The seats don't offer any lumbar support to help me sit up straight. NVG's definitely cause neck pain when used for 2 hours or more. However, I do notice when you're flying goggles a lot, you become used to it.</p>
<p>The survival vest is very heavy.</p>
<p>The way I have to sit to reach the collective with the seat full up pinches a nerve in my left upper back and has put my entire arm to sleep in the past. My lower back also hurts due to the complete lack of lumbar support in the aircraft</p>
<p>The weight of the HUD in addition to the NVGs is substantial.</p>
<p>The worse back pain is felt during DLQ/RLQ recurrency periods when one has to land expeditiously on the back of a CRUDES ship. Seat cushion padding is initially enough but cushions do not typically get replaced until padding is woefully insufficient. Also, I feel the need to be hunched over while flying to be in a comfortable position and combat fatigue during a typical 3.5 hour flight at sea. As I get older the onset of back and neck pain come quicker during the flight and gets more frequent/stronger. My back and neck pain is stronger and more frequent the more flight hours I have in a month.</p>
<p>There is no backward lean to our seats. This is extremely painful on longer flights</p>
<p>There is no lumbar support in H 60 seats.</p>
<p>There is not a good lumbar support so you have no back support to keep you in a good posture position and all the gear weighs you down.</p>
<p>Time in aircraft. Sitting on hard seats. If air filled cushions are inflated, they tend to put my feet to sleep because the outer edge overinflates as the bony part of my butt pushes the air there.</p>

Timed to amount of flying - consecutive days. NVGs make it worse, but multiple days of flying do the same thing.
tingling in the legs after long flights
To be as specific as possible, my pain usually manifests itself in my spine, right between the shoulder blades and slight discomfort in the small of my back.
towing AMCM in the helicopter makes for an uncomfortable ride (ball out, wing down) and it wears on your neck and upper back when you are strapped into the front seats typically as wing aircraft looking too much to one side (for neck pain)
Unless you are over 75 inches tall or so you have to hunch to hold the collective and maneuver the cyclic appropriately to fly. It seems to work fine if you are tall with long arms.
upper back/neck pain anytime I use NVG's lower back pain after 3 hours any flight profile
usually doesn't bother me in flight, just very difficult to get out of aircraft at the end of the flight and painful for the first few hours after a long flight.
Usually my lower back pain is from the "helicopter hunch" and how I sit hunched over to comfortably reach all of the controls. If I were to sit up straight I would not be able to reach the trim switches on the collective or cyclic. But I also purposely leave my seat all the way back to prevent my knees being too close to the flight and mission displays.
Usually the back pain comes after extended flight of 4 hours or more without getting out of the aircraft.
vertical vibrations definitely make the back hurt worse, especially in an out-of-track H60!
VERY INSUFFICIENT LUMBAR SUPPORT
Vest weight is all forward on the body and often pulls the shoulders forward and down putting strain on the lower back. When NVGs are added, it just exacerbates the problem
Was in a Class B mishap in HTs, Broke my back, believe all recurring back pain to be related.
we do need counterweights for NVDs
We do not have VOX in the TH-57. We have 3 options to speak over ICS: hot mike, a trigger switch, or a foot switch. Hot mike is just not realistic 99% of the time. The trigger switch does is not the best option when the other person is flying because then I'm applying pressure to the cyclic when he's on controls. So, for the most part, as the non-flying pilot (which I am most of the time since I'm an instructor), I use the foot switch. By having my right leg constantly 'cocked' ready to press/release the switch, I have leg and back aches (in addition to back aches for other ergonomic reasons). A VOX option would alleviate this.
We need the NVG counter weights to be funded. Also most padding is hard to get replaced due to slow supply.
Wearing NVG's definitely puts a major strain on your neck
When I first started flying the MH-60R, I flew several 8 hour missions with no ill effects other than some normal stiffness. Now I (4 years later), I have significant lower back and occasional upper back pain after missions as short as 3-4 hours.

When I went on my dis-associated tour, the pain ceased. It returned after being back in the cockpit a few months.
When it occurs it's usually just a mild ache. Generally happens on longer flights.
When wearing the NVG battery pack, lower back pain occurs because you cannot hold your head back far enough. Your neck is constantly craned causing stress on both the neck and lower back.
Where the shoulder harness attaches to the seat is too low. When it is tightened it compresses the shoulders and spine encouraging sitting in a hump position.
While not necessarily related to back pain, the majority of discomfort I have felt is after long bags (4+ hours) and normally felt on the outside of my hips.
While the 60 has lumbar support, if you looked at the vast majority of the seats, the lumbar support 'pillow' would be better removed as it sinks to rest below the lumbar area and as a result gets balled up and becomes next to useless.
While the back pain may not have been directly due to flying, long hours in seat while flying hunched over cyclic aggravated the situation.
Without the supplemental cushion/lumbar support that I personally provide, any flight longer than 2 hrs would be very painful due to insufficient lumbar support and the seat cushions being so thin and worn out.

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## APPENDIX L. SUMMARY OF PAIN AFFECTING SA OF PILOTS

From question 32 of the survey, "Please describe how the back and/or neck pain affected your SA," the following appendix was created. The comments were slightly edited for typographical errors and misspellings. Comments were selected if feedback could be beneficial for NAVAIR engineers and/or decision makers of the NAVAIR Community.

A chronic nagging pain due to terrible seats
A nagging pain by nature distracts you and fatigues you.
After approximately 2.5hrs my back begins to give me problems and can and does my ability to focus all of my thoughts on flying and does drive my SA down.
After long flights (>4 hrs) the pain is enough to be distracting, causing me to constantly shift my weight and position
An in ability to sit in a single position due to the pain in my back causes me to constantly shift in my seat. During those times I am oblivious to the other events occurring in the cockpit.
Any discomfort results in less attention paid to your environment and the aircraft. When restricted in your ability to relieve that discomfort, SA will continue to degrade until setting down and being able to walk it out/stretch.
Any distraction for the mission at hand will detract from your SA. Adjusting your sitting position, straps etc takes your focus away from any inside or outside scan. Not saying it is severe or long term, but a distraction.
Any time the flight environment demands moderate attention, you forget about the pain and do whatever you have to for the mission. I would say it is a mild hindrance, if any, to flight safety. It is fairly annoying after the flight though.
Any time you have to squirm or adjust your body to some un-normal position to stop the pain you are no longer in the seating position you are used to and train in. when you shift your body your frame of reference is altered and you have to choose pain or ever so slightly relearning how to fly the aircraft from the new position.
Anything that distracts from an already difficult mission takes away from SA. If I'm thinking about my back pain or trying to find a position that will alleviate the pain I am not thinking about maintaining situational awareness
At some point during the flight, I will likely transfer controls to the other pilot and start a series of twists and small stretches to try and alleviate some of the pressure on my back and neck. During this time I am usually not 100% focused on the instruments or gauges. I always make sure we are out of the 'terf' profile when doing these stretches.
At times the muscles causing the pain would cramp and cause a loss of focus.
At times, having to stretch or move due to back pain distracts from other tasks.
Attention is spent trying to readjust in the seat or to move neck around that could detracts from being 100% focused on the task on hand. It did not reduce the SA by much but that extra bit of attention could be the difference in being able to avoid a mishap.
Back and Neck pain is usually most pronounced from 30 minutes to 10 hours or so after landing. The pain is usually not significant during flight (yet).
Back pain / leg (sciatica) discomfort is not very distracting in flight but immediately

following a flight it is more noticeable.
Back pain is worse after landing and getting out of the helo.
Back pain occurs post flight only
Back pain tends to be chronic, and I just have to focus on the task at hand. Neck pain has gotten bad during night flights. Again, trying to focus on the task at hand and not the pain is difficult.
Because I have to shift the way I am sitting several times. I should not be thinking about how my lower back and buttock hurt.
Began concentrating on rubbing the back of my neck and removing hands from flight controls
Besides shifting in my seat to alleviate it, it doesn't really become a factor
By being concerned with back/neck pain I am distracted from the flight, reducing my SA. I also become concerned with correcting/adjusting my posture and seat fit in order to alleviate the back/neck pain and become distracted during the flight thus reducing my SA.
can be a constant background nuisance.
Causes me to scan slower.
Concentrating on moving and shifting around to get comfortable, rather than 100% focus on flying. Also, over extended periods, I'm focusing on when the discomfort is going to end, rather than on flying.
Concerned more about the discomfort than the flight.
Constant Re-adjustment to alleviate needles in back.
Constantly adjusting and stretching distracts me from the tasks at hand. if I had a more comfortable seat that caused less pain I could spend less time trying to get comfortable and more time executing my mission.
Constantly adjusting my sitting position. Especially prevalent on longer flights
Constantly adjusting your position within the seat while attempting to get comfortable.
Constantly have to fidget in seat and try to stretch instead of concentrating on flying.
Constantly having to adjust my seating position in the seat, taking hands off controls or passing controls to copilot
Constantly having to swap controls to twist and try and stretch, degradation in instrument and VFR scan
Continual shifting in the seat and manipulating helmet and NVGs to alleviate pain, distracting from gauges and VFR scan
Definitely have to work harder to make sure it doesn't affect you SA.
Did not realize the severity of back pain until I climbed out of the aircraft. However, I was constantly trying to adjust for the neck pain while using NVG's
Discomfort. Is most bothering the following day after a long flight
Distracting and had to pass the controls to the other pilot to try to stretch it out. Taking away from backing up the flying pilot.
Doesn't affect SA but it requires me to adjust and move around to try to alleviate the pain.
Doing circles, its easy to loose focus. I adjusted my position to a posture that did not allow for the most rapid response time to an A/C emergency
During busy flights it is a minor distraction due to other items occupying my mind. The less busy the flight the more distracting it becomes.
During high workload, back pain not noticed. When workload drops, it back pain becomes more prominent and makes staying focused on flying harder.
During long flights I shift around in the seat a lot to try to stay as comfortable as

possible and that gets distracting.
During the flights where my butt hurt, I had to adjust my sitting position many times.
Even a moment spent thinking about back pain is a second spent not looking for traffic or scanning instruments. May not seem like a lot, but it could be prevented.
Excessive movement and shifting to try to get comfortable is distracting.
Experience allows me to pay attention and fight through the pain but any discomfort aids in loss of SA
Feeling constant throbs in your back is hard to ignore and makes it difficult to give 100% attention to mission requirements.
Find myself shifting in my seat, and shifting the weight of my vest, and adjusting my harness; instead of concentrating on the mission.
Focus starts to become just finishing the flight and getting stretched out
Focused on trying to stretch out and get rid of pain rather than current tactical situation.
Focusing on anything other than flying affects SA. Trying to find and maintain a comfortable position in the helicopter is a distraction from flying.
Focusing on constantly shifting position is a distraction.
Focusing on getting more comfortable to alleviate the pain takes attention away from flying and fighting the aircraft.
Had to concentrate on removing cramps as opposed to flying the aircraft or running the mission.
Had to shift around to find a comfortable way to sit.
Harder to focus with the discomfort
Having back pain is distracting at times and can cause decreased SA when thinking about the pain instead of flying.
Having pain distracts my attention from flying.
Having to adjust back and neck positioning when I should be scanning gauges and keeping still
Having to think about your neck is less energy to think about not crashing
I am constantly aware and it is annoying. After the flight I have to stretch just to feel normal again. Over time I can see it become debilitating.
I am constantly having to adjust myself while flying. When the back pain starts I have to lift my self off of my seat taking my focus from flying or being a copilot and continuously adjusting my sitting position. Also with back pain my focus is not on the mission but getting back to the ground to stretch and relief the pain.
I am successful at ignoring pain/discomfort during flight. It bothers me throughout the rest of the day, though. It indirectly affects my SA because it causes me to wake up multiple times throughout the night which makes me tired which causes me to not perform at my highest level. It directly affects my SA for short moments when I need to continually adjust my lumbar support (whenever I move forward to adjust a cockpit knob, the lumbar support moves into an unfavorable position and I need to move it back where I want it).
I can't think of one specific time but I do know there have been times when I thought I was locked and realized I had unlocked my harness to stretch. I still feel I have SA but it is one more thing that is on your mind that probably doesn't need to be.
I didn't want to turn my head to clear if my neck hurt.
I feel that any time an outside factor is causing me to think about it I'm distracted from my flying.
I found myself constantly adjusting my position to try to alleviate the pain. During that

time I was not concentrating on flying. As flight instructor teaching students in initial helicopter flights this was not safe.
I had to constantly adjust my posture and or configuration on my helmet, taking away from my SA in and out of the cockpit.
I have to reposition the way that I sit every few minutes to help relieve pain.
I have to slouch to the left to reach the collective. So when I am not at the controls I have to focus on stretching out my back in the other direction.
I just ignore it to continue the flight.
I know it's there and will be there when I climb out, but I try to compartmentalize it so it doesn't affect me. I can see in the future it becoming an issue.
I shift often in my seat when I have pain and it distracts me.
I spend time adjusting my extra lumbar support when I could be focusing on the flight
I spend too much time adjusting in my seat trying to find a happy place, sometimes passing controls so that I can move around and stretch my lower back.
I tend to move around in the seat quite a bit after 2 hours, it is difficult to get comfortable.
I think sometimes you can't help but notice the pain, but for the most part, it won't affect SA if you don't let it. However, it would be nice not to have to deal with that additional factor.
I was always thinking about it and not comfortable.
I was aware of the pain but it did not affect my ability to focus.
I was constantly shifting position trying to find some relief. The pain made it hard to concentrate.
I was thinking about the pain, and having to block it out. That mental dialogue of "it hurts, ignore it, ow, ignore it" takes away from the mental acuity needed for flight, particularly on NVGs, and thus decreases SA.
I would compare it to having to use the bathroom very badly in flight.
I would have to shift myself around in the seat or bend forward, thus losing SA for that time period.
I would say the only distraction was that I was squirmy in my seat. I would take any opportunity I could to try to stretch or move around to alleviate the pain.
If preoccupied by pain, it's more difficult to focus on flying.
If you are thinking about your pain and not the flight then that is affecting your SA
I'm sure it has decreased my SA a little but is not enough to effect my decision making. I am, however, a little worried for flights in the coming years.
I'm too focused on the flight to think about my neck and back its always after with all the gear off that I experience any pain
In ability to focus or focused on pain and what to do to fix it, rather than flying the aircraft. Extreme neck pain was usually on NVGs or immediately after the flight. Prior to getting a better liner and weighted NVGs, pain has been so severe that I've had bad headaches hours and even all night after a flight.
Inability to concentrate while consistently adjusting NVDs/Helmet.
Instead of focusing on the mission/instruments I was focused on readjusting my seat, and trying to make myself comfortable.
Instrument scan and outside scan, communication, and attention span all slow down or decline when pilot is fatigued. Being in pain causes fatigue.
It affects my SA in the a/c only slightly on single bag flights because I have learned not to think about it. However once I start flying multibag flights the pain starts to get distracting.

It can especially in longer flights because it adds to the fatigue factor. NVG's add to the fatigue factor. Your eyes get tired, the NVG weight starts to hurt your neck, and finally the constant vibration and inability to stretch makes your back become tight and sore.
It could limit eye scan while on NVDs affecting ability to clear the aircraft of obstacles
It didn't I powered through but paid later.
It doesn't effect it that much, but causes more fatigue on long flights.
It hurt so I didn't allow me to focus.
It is hard to focus on the mission when you are constantly moving around in the seat trying to get comfortable.
It is more irritating that anything. It's hard to concentrate on what's occurring when I'm dealing with the uncomfortable seat and back pain.
It required a lot of shifting in the seat to alleviate the pain, thus resulting in less time spent focused on the flight environment.
It seemed to go along with fatigue...it made it harder to concentrate and required that I maintain a tense posture.
IT takes your focus away from what you should be concentrating on and making you try to figure out how to change your posture so the pain goes away... when you should be focusing on flying the aircraft and staying ahead of the game so you can complete the mission.
It took my mind off the mission at hand. Having to adjust my seating posture and goggles also degraded my SA.
It wears on you over a flight. For one day, it is not so bad, but after a week of solid flying, I'm physically exhausted and achy.
It will begin to affect SA due to distraction cause by the discomfort/pain,
It's a moderate annoyance.
It's not too bad when I'm flying... just after I get out and try to stand up straight like a normal person. It's reverse evolution!
I've had several days where I cannot turn my head to the left because I get a shooting pain through my neck and upper back. Since instructors sit on the left side of the aircraft, it's extremely painful for me to continually clear the aircraft to the left because of my neck/back pain.
long bags while deployed you become fatigued mentally and physically but the back pain adds to physical fatigue
Lose your focus during instrument flights. Adds to your fatigue.
Lumbar muscle spasm made sitting very uncomfortable; difficult to clear the aircraft well due to inability to move well enough to see through all windows--ultimately resulted in a temporary down status.
Made it very uncomfortable to fly. I felt I had a hard time concentrating.
Makes you think about the pain somewhat instead of the mission
Mild enough that it only really bothered me during low intensity (boring aspects) of the flight.
Mildly irritating and I'm trying to readjust myself in the seat to get more comfortable.
Minor degradations to SA due to increased fatigue.
More concerned with getting comfortable then what is going on with the flight.
Must make an conscience effort to concentrate on flight.
My back hurt enough to have to pass controls and take a few minutes to hold myself off of the seat using the forward handhold to relieve pain.
My back/neck will hurt during the flight but I don't let it affect my SA

Neck pain after 2+ hours of goggle time forced me to regularly swivel my head to "un-kink" connective tissues and muscles.
Neck Pain during longer flights (especially on NVGs) progressed into headache on several occasions. One time, it became annoying enough that I "ORM'd" the flight about 3 hours into a 4 hour bag.
Neck pain makes it difficult to look over shoulder, particularly during NVG use or formation flight
Neck pain wearing NVGs for a long period of time decreases my range of motion wrt moving my head around.
Neck pain- while wearing NVGs the neck pain can be intense enough to limit head movement - limiting field of regard.
Need to adjust seating position to alleviate pain requires change of controls and momentarily distracts from copilot duties.
Not a significant impact on SA, but hard to stretch to relieve soreness while in the aircraft
Occasionally my back pain in the aircraft causes severe enough discomfort that it distracts me from cockpit duties such as scanning for other aircraft or following our route of flight on a chart. These instances are rare.
On a cross country from Fallon, NV to Jacksonville, FL, caused a degradation of focus and loss of SA. No physical deterioration from any crewmember.
On flights longer than 2 hours, my back/buttocks pain increases with the duration of the flight. By 4 hours in an armored seat, I am squirming and adjusting in my seat to try and get comfortable. Definitely SA detracting.
Once my neck pain was so severe I had to go med down while it healed. It was on a small boy so I only saw HM1, who did not down me, but the pain was so severe I could not fly or function, I stayed in bed for a day, and then didn't fly for another.
Once pain develops I spend considerable effort trying to "readjust" my position which detracts from scan/attentiveness.
Only a few times on flights that went past the 3.0 hr mark. Because of the poor posture caused by the seats, my lower back gets really stiff. To alleviate, I have to relinquish controls and try to stretch my back using the upper hand holds as leverage.
Pain doesn't usually affect my SA, though there have been times when being uncomfortable has required me to pass the controls and take a break from flying to stretch and alleviate some of the back pain.
Pain is a form of bad stress. All bad stress affects your SA whether you realize it or not.
Pain took away focus for a second, but did not distract for more than a second. The shock of pain was the worst part. was able to complete mission.
Pain was great enough that it distracted me from flight duties.
Sharp pains cause momentary loss of SA
Shifting in the seat takes place instead of scanning
Shifts focus from flight duties to pain mitigation.
Simply a distraction whenever I had to try and stretch out my back to ease any tension
Since it happens almost every flight, I'm used to it. Can't imagine a flight without some back pain, so I can't say what my SA would be without the pain.
Sometimes I have to pass the control and try to readjust my seats, or just trying to stretch out my back and neck. it could be very fatiguing.
Sometimes the pain in my back gets to be so intense that I really can't concentrate on the mission very much. The only solution I have been able to come up with that

alleviates the back pain during flight is to fly with a loose fitting shoulder harness rather than one that has been cinched down all the way.
Spent time finding a comfortable position to minimize pain and this decreased my scan and increased pilot workload
Spent too much time trying to find a position that feels good and less time looking out the aircraft and flying.
Start to think about my back, stretch out, etc.; and therefore don't have as much SA compared to if I wasn't thinking about it.
Takes away from the focus during demanding missions.
Takes focus away from flight duties.
The annoyance of back pain is simply fatiguing and distracting.
The back and neck pains were not detracting from Situational Awareness; however, they made egress difficult due to stiffness (especially when wearing body armor and full vests.
The back pain affects my sleep and play with my kids more than my flying.
The discomfort in my back made it difficult for me to focus on the mission at hand at times.
The effects are most felt after the flight.
The longer the flight, the more uncomfortable you become, the more it affects SA
The pain affects my ability to concentrate on the task at hand.
The pain distracts from monitoring flight parameters.
The pain does not affect my SA. However, I feel that I have to adjust my position often. It is annoying and nagging, however, not painful to the point of losing SA. Most of the pain comes after the flight.
The pain itself was a large distracter by itself and there was always the need to readjust my position and the largely ineffective lumbar support pad.
The pain was enough that when I was not actively engaged in flying the aircraft I was constantly shifting in the seat to alleviate the pressure.
There are times when you have to stretch or adjust position to ease the pain and that takes your mind off of your flight profile.
Thinking about how to adjust to make your back hurt less afforded less brain power to other tasks at hand. Was more distracted.
Trying to adjust the seat or my position in the seat while other pilot is at the controls. my head is down and focus is not up looking outside
Trying to find a comfortable position in the aircraft can be distracting
Unable to concentrate on mission while trying to find a position that was comfortable for long flights.
Unable to stay focused on mission. Required frequent "breaks" to try stretch out and adjust position to improve comfort.
Uncomfortable to scan as much due to discomfort in lower back and neck
Usually don't notice in-flight - usually manifests post-flight, or at least that's when it's noticed.
When focusing on back pain during a long plane guard flight, SA is compromised as you try to relieve the stress by moving rather than scanning inside and out
When focusing on pain and how to eliminate it I am losing focus on the aircraft and what it is doing
When in pain, I don't pay attention to my surroundings as much. Concentrating on the pain in the back takes away from the concentration of other more important things.
When in pain, some of my attention is focused on the pain, fidgeting with the seat,

trying to find a comfortable position
When not task saturated in the tactical environment, it creeps into my thought process. Could potentially become a distracter, risk currently mediated through active CRM/ORM.
When something is painful, you think about it, not your job.
When the pain reaches a certain point, to alleviate the problem I unlock my seat harness, and push up on the seat to let my lower back hang for about 30 seconds and stretch out. When wearing NVDs I usually have to adjust the helmet aft, and try to stretch out my neck to reduce the pain and allow me to focus again. Both of these problems cause transient loss of SA when I ensure the other pilot is safely flying, and spend about 1 minute with my primary focus on reducing the pain to a tolerable level, which will allow my full attention to be placed on the tasks required for safe flight and mission accomplishment.
When there is an annoying pain you cannot clearly focus on the task at hand whatever it may be
When you are attempting to relieve pressure on your seat and lower back, it is impossible to maintain SA on everything that is going on around you. Pain is a centering phenomenon, in that it calls attention to itself, and other things will get pushed out of the way. Even if you are successfully able to push it to the side and ignore it, it will slowly intrude back into your awareness as it progresses. If nothing else, it tends to raise one's frustration level, which occasionally results in inadvertently sharp or critical comments or reactions, thus slowly degrading CRM. This is particularly evident when you are at a boat, flying say 5 hours of ASAR, and swapping copilots - they do not generally understand the heightened tension vice a first-go. At least with two pilots both at the same 5+ hour mark, they are slightly more irritable, but both individuals know why and can empathize and thus are better able to ignore inadvertent implications/discomfort-caused criticism/complaints.
When you are in pain it always leads to complacency
When you have any type of pain it will take away your SA for anything you do
When you have to fly more than three or four hours, certainly beyond four hours, the discomfort becomes a distraction. You do a gas and gages check and then break loose your seatbelt so you can try to move around and relieve the tension, then strap back down and press. You get distracted by in your efforts to relieve the discomfort.
While I do notice the neck pain on NVDs, most of the time I don't notice the back pain until out of the aircraft.
While it doesn't happen terribly often, when I do experience back pain, I am squimish in my seat and SA decreases as I focus some of the attention on the pain instead of flying.
While my neck hurts using NVGs, their use still drastically improves SA in the dark.
With the upper back pain it makes it extremely difficult to fly the aircraft. It usually involves passing controls so I can attempt to stretch it out.
Worry about adjusting my helmet and goggles to relieve some of the neck pain caused me to not focus outside or to take a hand off of the controls, which can be obviously hazardous in the terminal area/final approach
You are constantly have to readjust your position in the seat to relieve the pain while not focusing on the flying.
You are thinking about the pain rather than flight related items.
You begin to shift in your seat and focus on the back and/or neck pain. It may become a topic of conversation as opposed to the mission at hand.



You deal with it and try to stretch out when you can.
You focus on trying to feel more comfortable by thinking of ways to sit, while not thinking about important things.
You get focused on how uncomfortable you are so that takes away from the additional focus you could be having on the situation.
You spend a lot of time adjusting in the seat, or rubbing your neck, and it distracts from your focus on the mission.
You start spending time adjusting position and trying to get rid of discomfort instead of what's going on in/around aircraft.

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## APPENDIX M. SUMMARY OF PAIN AFFECTING SA OF CO-PILOTS

From question 36 of the survey, "Please describe how the back and/or neck pain was affecting the co-pilots SA"; the following appendix was created. The comments were slightly edited for typographical errors and misspellings. Comments were selected if feedback could be beneficial for NAVAIR engineers and/or decision makers of the NAVAIR Community.

A nagging pain by nature distracts you and fatigues you.
As an FRS instructor I would see a lot of new pilots who were still trying to get comfortable in the chair and with the NVG's. Initial NVG flights were often where I would see the neck discomfort affect the students flight. Not sure if that was from the added weight of the NVD's or from the seats themselves.
As the copilot was distracted dealing with back/neck pain and subsequent adjustments in order to alleviate the issue, their SA was degraded. The pain also caused more frequent breaks from flying in order to step out of the aircraft and make adjustments in order to alleviate the issues, thus reducing our continuous on station time.
Assuming people to be pretty much equal, if pain distracts me, it probably distracts other pilots too.
Became a discussion item during the flight and part of our ORM discussion before the flight.
Can't really comment because most people wait until after flight to talk about back pain. However, I'm sure it would affect SA in some way.
Co pilots SA was affected
Complaining distracts everyone
Constant complaining and fidgeting in order to get comfortable.
Constant complaints, and attempts to reposition in seat. Also pilot would not leaving the cockpit on long flight days (to eat or use restroom) because of fear back hurting worse when getting back in.
constant fidgeting
Constantly adjusting in the seat or rubbing the neck. Distracts the pilot from the mission.
Constantly have to swap controls to stretch, adjust yourself.
Co-pilot brought it up during the ORM brief. Mission was an FCF. Co-pilot was running the checklist. ORM brief was if co-pilots back acted up and became an issue, we'd knock it off and return home. I remained on the flight controls the whole flight. FCF was completed without incident
Co-pilot had head down trying to adjust seat or was adjusting harness
Copilot having to pass control to stretch out, or get out of seats to go to the cabin.
Copilot just ignored back pain.
Co-pilot spent more time focusing on finding the best position to fly while trying to maintain some sort of assistance to the flight mission
Co-pilot would discuss back pain and/or get distracted by it, losing SA.
CP WANTED TO PASS THE CONTROLS TO STRETCH OUT AND "UN-KINK" HIS

NECK AND TWIST TORSO TO RELIEVE BACK PAIN. OFTEN HAD TO PUT DOWN CHARTS OR STOP TACTICAL EQUIPMENT FUNCTION TO RELIEVE PAIN.
Discomfort in the aircraft is a distraction to flying.
Discomfort leads to inattentiveness
During one flight in 2004 my copilot (who was a male H2P 5' 5") was completely incapacitated with back pain and was hunched over during final approach. (DAY VFR Shipboard ops)
Fatigue, talking about back pain rather than focusing on the mission
Having to pass the controls to adjust
He had to stretch and "pop" his back into place. He had to wait until we had a moment in the flight that he could do this.
He kept adjusting his seat and lumbar pad to try and help. He was constantly adjusting it and wasn't really paying much attention to the flight.
He seemed to be adjusting his helmet fairly regularly, with a lot of attention given to getting comfortable.
He was clearly uncomfortable.
He was complaining about it.
He was moving around for most of the flight in order to alleviate the pain.
He was shifting in his seat, thus not providing as much backup for the mission.
Helmet had to be removed, ultimately making us single piloted. Copilot was completely disengaged.
His field of vision was restricted due to difficulty in rotating in his seat.
I am not certain if this applies because I could not read his mind
I am not sure. I just know that probably half the people I fly with have complained about back and neck pain into the A/C
I find that the back pain just usually fatigues both myself and my co-pilot more quickly and that is what usually causes the break down in SA.
I had to abort the flight and RTB.
I had to fly for him.
I had to take the controls from the copilot while he/she adjusted themselves and listen the complaints of pain which told me that they were not focused on the mission at hand but focused on the pain
I had to take the controls while the CP readjusted or tried to self-massage the affected area.
Increased attention inside the cockpit, decreased awareness outside the cockpit and limited width of regular scan
It is uncomfortable so it grows irritating throughout the flight.
It seemed like they were trying to get comfortable.
It was definitely a distraction though.
It was discussed during the ORM brief that if his back became an issue, we'd RTB and knock it off.
It was just very uncomfortable for my co-pilot.
I've cancelled events due to my co-pilots' back pain and discomfort: can't train if you can't think
Jr. Pilots dealing with extreme weight of NVD's
Just found it very irritating.
Lots of seat moving up/down fwd/back... Many occasions where I didn't think he would have been ready for the controls if I had to pass them.
Made them grumpy

Minor adjustment of the seats and cushions. Pilot mentioned about the uncomfortableness but it did not affect the flight.
Minor degradation to SA due to increased fatigue.
Missed low altitude calls and backups to flight profiles
More focused on the back pain then the flight.
More frequent control swaps and heads down adjusting seat and cushion position.
My copilot brought it up during flight meaning his mind was devoting attention to that instead of elsewhere.
Neck strain due to NVGs made their scan break down. Active coaching and insistence by the HAC was needed to get their head moving on low-light, deployed, embarked ops.
not able to focus on the task at hand
Not sure if it impacted SA. Just knew that they were complaining about it.
Not sure on how the back pain affected the co-pilot, was just brought up in the brief prior.
On long flights the other pilot would adjust himself or lift himself out of the seat to gain momentary relief from back pain. During that time the pilots attention was not focused on the flight.
Paying less attention to flight related items.
Pilot had neck pain not allowing him to fully rotate his head for full field of regard.
Pilots constantly shift in seat
Reduced scan speed
Restriction to comfortable range of motion limits the ability to maintain SA
Same from how pain affected pilot's SA. We constantly study the swiss-cheese model, and ORM, and say reduce the easy risks to allow more focus on difficult-to-manage risks, but do not provide any method (i.e. the previously authorized seat cushions or air cushions that can be reinflated in flight) to minimize this entirely eliminate-able factor...
Same reasons as pilot. Had to adjust to try to relieve pain.
Shifting and general pain, no ability to leave the cockpit and walk around in the cabin of the 60 for 5+ hour flights is quite uncomfortable.
Shifting in the seat distracted c/p.
Shifts focus from flight duties to pain mitigation.
Similar. Unable to maintain mission focus for extended periods of time and needed focus all attention on adjusting seating position and stretch out.
Sometimes the pain becomes a topic of discussion in flight, and leads to other conversations, i.e. the ergonomics of h60 is not ideal.
Spent time periodically during the flight attempting to stretch out the back and legs, twisting and repositioning to lessen the pain.
The co-pilot was unable to sit still. He had to continually shift in his seat and discuss his issue. This topic of discussion took away from the mission at hand.
The co-pilot's back pain caused him to fidget and shift in the seat constantly.
The individual was distracted by trying to comfortable.
The neck pain made the copilot not want to wear NVGs; which would have reduced the flight's collective SA substantially. Back Pain has also been a factor on multiple flights which have increased fatigue at a rate quicker than normal, which reduced SA.
The pain cause fatigue and it distracts from the job at hand.
The responsibility to safely fly the A/C and response to system malfunctions and emergencies was on me. Although and active member of the crew, they weren't exactly prepared to make cat-like reflex inputs to help save an A/C.

The younger the copilot, the less they are used to NVDs, so the first couple of times they fly with them, their neck pain is such that it is obvious their focus is not as sharp (missing advisories, missing voice calls, etc.)
They complained about the pain, rather than being engaged in flying.
They were basically only able to tune radios
They were fidgety and bumped controls and were behind the aircraft
They were focused on the immediate concern, decreasing pain, not focused on mission, crew, or basic airwork.
They were focusing on the pain and passed the controls so they could move around to keep their feet and legs from falling asleep
They were not as focused.
They were worried about their back, not totally concentrating on the flight.
This occurred when I was an H2P flying with a department head, age 37 with around 2000 hours, most in H-60s. After about 2 hours, he would frequently need to adjust position or "stretch out" during a flight, which was a significant distraction for both of us.
Too busy adjusting and not scanning
took attention away from backing up flying pilot
Trouble staying focused on the problem, constantly re-adjusting in the seat/ adjusting the very weak lumbar support.
Unable to 'most' effectively scan, as his pain limited the speed at which he would move his head.
When both pilots are talking about their backs hurting, they're not thinking about the mission
With flights greater than 4 hours, the co-pilot complains of back and neck pain.
You can see that the person is focusing on the fact that it is so uncomfortable. And it at least takes a small amount away from what we should be focused on.

## APPENDIX N. SUMMARY OF ADDITIONAL COMMENTS

From question 55 of the survey, “Is there anything you would like to tell us related to back and/or neck pain in relation to flying?”; the following appendix was created. The comments were slightly edited for typographical errors and misspellings. Comments were selected if the feedback could be beneficial for NAVAIR engineers and/or decision makers of the NAVAIR Community.

A concern for me is that if I were to ever (God forbid) get in a crash, would the seat straps hurt or help me. I just can't tell how I feel about it at this time.
Actually, my biggest concern in the MH-60S is buttocks pain due to insufficient padding. Can be just as annoying and distracting as back pain.
After 12 years, I had to get surgery. Luckily I was able to regain flight status.
Again, I feel that over the course of a career flying navy helicopters one could develop a disability which would in turn have to be paid for later in life. The navy could save money by developing a better seat for aviators, especially those in the H-60 helicopter.
Along with improving flight gear and ergonomics in the aircraft, the Navy needs to invest in the health care of its pilots. One way of doing this would be to offer chiropractic services.
Already have.
AMCM is a very special regime of flying. After a 5 hour tow mission, pulling 8,000 lbs of tension with a 20 knot quartering tail wind you certainly feel it all over your body.
Armored seats don't have to be uncomfortable. It can't be that hard to design a seat that is comfortable to sit in, with decent lumbar support.
At least we don't have to eject...
Back and neck pain is in the majority of cases caused by cumulative effects of bad posture, vibration and repeated traumas. Sitting in sustained flexion, doing risky exercises like sit-ups (which a ton of exercise physiologists say is horrible for spine health) and being exposed to vibrations sum up to cause problems.
BACK PAIN OCCURS ON LONG FLIGHTS AND THERE IS NO LINGERING EFFECT ON THE NEXT DAY
back pain which led to chiropractic care was not flying related. I sought civilian care because military care was too difficult to get in due to long appointment lead times.
bad seat cushions and long flights.
CAN BE DISTRACTING

Can't help or fix every problem but good physical fitness (core strength) and good stretching can help some people. Although I have also had worse problems days I have run before flying because I will get more tight and it will strain my back more. Would like to know about long term effects from the vibrations and hours of walking on metal flight decks.
Chiropractor is the only way I have found to fix back pain. Thankfully my wife is a federal government employee with Blue cross and Blue Shield which covers chiropractic care. I wish Tricare covered chiropractic care. I think every Wing should have a Chiropractor on staff.
Chiropractor: I have never seen one because I do not want to pay for one out of pocket. The Navy does have them as far as I know, but not at my base. I would have to travel 45 mins to the other base in the area and that would add stress in my life trying to make time for that. Massage therapy: I pay out of pocket for a monthly massage. This definitely helps alleviate some pain for about 1.5 weeks after the massage. On a scale of 1 to 10, my daily back/neck pain is an 8. I have been in the cockpit for 10 straight years. While I will miss flying, I am looking forward to my next tour which will be non-flying and hopefully less stressful to my body.
Comes with the job.
Design a harness or back brace for helicopter pilots and issue them. I wear a back brace that I bought from my civilian chiropractor and it works very well when I fly.
ergonomic seats would make all the difference in the world
ergonomics is only part of it. education on proper diet, sleeping position, stretching, exercise is the other part of it.
even guys who don't complain about their back complain about their glutes hurting
Fix the seats!
Flight surgeons need to be better trained on the treatment and identification of back pain. The first 5 times I went to medical I saw different flight surgeons and was given Motrin and muscle relaxers and sent on my way. No further treatment was made available. It took me demanding further treatment to be allowed to see a physical therapist. The PT was able to properly evaluate my issue and gave me exercises and stretches that helped limit my pain.
Flying is necessary, NVGs and body armor are necessary; until there are suitable replacements for them, the seats need to be improved to increase aircrew endurance and reduce disability cases after leaving the Navy.
Get newer, nicer, more effective cushions that get replaced more often.
Getting massages regularly helps - wish Tricare would cover
God bless you for trying to fix it!
Great survey. I hope this data can lead to some changes. I consider myself lucky in that I have little to no pain but some of my good buddies do. For some of them a 4.0 hr flight is an Iron Man competition.



Harnesses do not get locked while flying a helo. There is too much movement to be done to move controls, look around, press buttons, etc. Auto lock of harnesses works during a crash, but kills the shoulders afterwards.
Helo hunch won't be solved until you recline the seat slightly, put the controls in or near the pilots lap, and remove obstacles to outside scan. Until then, adequate lumbar support and removal of vision obstructers will go a long way.
Honestly, maybe I should just focus on better posture and do some back strengthening yoga.
I am about to get out of the cockpit for the first time...this will allow me time to get all my issues looked at.
I believe it is a significant issue that affects the long and short term health of many pilots.
I believe that proper exercise can mitigate my back pain. Although I get it occasionally following or during a flight, especially after long flights, my strength training routine along with some yoga has reduced the long term pain to nearly zero.
I cannot stay fully locked and strapped into my seat belt and still reach the controls and keysets. I think if the seatbelts held my body firm against the seat, it would reduce the strain on my back. However, being constrained against the seat reduces my ability to reach all of the controls and keysets
I conducted some initial studies at NAVAIR with back/neck pain and helicopter pilots. A comment was made that "specific core and neck exercises and stretches have been shown to strengthen the muscles required for flight and reduce back pain." However, the person making the comment did not have the information on the specific study. If this is true, we need to get those exercises out to the fleet and socialize the long term effects and dangers and educate them on preventive treatments.
I do not know what the exact cause of my back pain is but, I started to experience it about 6mo ago and had never had any problems before. Due to others having similar pain, I can only assume it's from the helo (had no incidents/injuries involving my back).
I do visit a chiropractor in town and have for years. Allot of people don't go to them but I think they alleviate most back issues.
I don't see an easy fix to this problem, it's sort of the nature of the design, but it would be nice to have access to chiropractors without the threat of a downing.
I feel like I didn't have as much back/neck pain as I did numbness in my feet during long flights. Then inability for me to stretch out my legs combined with the very rigid design of both the cockpit and the H-60 seat were contributing factors to the problems I had with numbness in my feet.
I have been flying for 8 years and I have probably filled out a dozen of these surveys and the Navy has yet to act on all of the inputs they get.
I have been to a chiropractor a few times about my back. The seats cause severe pain and discomfort every time I fly.
I have not seen a chiropractor but I have seen a massage therapist

I hope this survey helps to point out the prevalence of this problem in helo pilots. My dad still has major back pain from the aircraft he flew and that was back in Vietnam. I don't want to end up like that.
I just hope that there will be a resolution to this.
I knew people had problems getting into the job. We fly a big vibrating brick. I'm most concerned with how the military will help with the effects years later. If one doesn't stay until retirement, they end up being kind of out of luck health care wise unless its bad enough to count as disability.
I never had any lower back pain prior to flying helicopters and now I do.
I really do see value in chiropractic in Naval Aviation.
I recommend moving the shoulder harness inertial reels to the bulkhead behind and above the seat backs. I also recommend eliminating the Y-joint in the shoulder harness (as it is now, the shoulder harness belts join right behind the pilot's neck). Therefore, use two inertial reels for each seat, one for the left and one for the right shoulder straps. These actions would improve seat ergonomics to the end of pulling the pilot's torso into the seat back flat, and upright. The location of the inertial reel at the base of the seat back and the Y-joint of the shoulder belts behind the pilot's neck both cause a top-to-bottom squeezing action of the pilots torso when the shoulder harness is tightened. This forces the pilot into a hunch or slouch.
I saw my flight surgeon for neck pain in the midst of a rigorous workup schedule. He kind of acknowledged that this happens but there wasn't much he could do. He seemingly reluctantly gave me a referral to a civilian physical therapist. The physical therapists seemed to be helpful but I was unable to go more than 3 times (my referral was for a recommended 10 or so visits) due to that rigorous workup and deployment schedule. I will probably get another referral in the future.
I think the seat cushions could be more comfortable. We were told that we could not use any personal cushions or support b/c they would change the crash worthiness of the seat.
I treat my pain with heat on my neck or seek massage therapy in order to avoid chiropractor.
I was almost medically attrited during flight school due to extreme lower back pain. I was evaluated by the NAMI flight surgeon and after a 2 minute exam I was recommended for attrition. I spent my own money on chiropractors and massage therapy to help with it. This is what "scares" many Naval Aviators. They are afraid of going into the doc and actually being honest when discussing their personal health.
I would love to see redesigned seats to address and hopefully alleviate back pain.
I'd like to see new seats in the 60B
If I fly more than 15 hours a month I have trouble sleeping due to back pain and back pain becomes increasingly more distracting for each subsequent month. Back pain is a pervasive problem in H-60's.
If something isn't done to fix the ergonomics of the seats and the padding, we will just continue to have these lifelong problems that are going to cost the military more money in medical expenses. Invest in designing better seats and cushions now to prevent these lifelong struggles.

If they can make ergonomic office chairs that you can sit in all day, they should be able to make a seat in the helicopter that you can sit in all day and won't destroy your back during a hard landing from an autorotation
IM IN PAINNNN
I'm not sure what my back pain is from so I don't want to contribute it solely to flying helicopters. But it may be more than just a coincidence that I have back pain and just happen to fly helicopters. I can guess that it may just be a few factors that go into making the pain worse: Flying with poor posture due to bad seat cushioning and ergonomics coupled with getting older and not having as much time to stay in shape as the more rank I get the more work and responsibilities I receive.
I'm only sorry I covered my pain up to keep my flight status. But, it was not an option to me then, now I pay for it and I feel much older than I actually am.
Important to keep it light and cool and provide plenty of cushion and support.
Improved design and increased availability of non-downing physical therapy/chiropractics/massage would help mitigate adverse physiological effects of flying while maintaining a flight-ready ready room.
In the MH-60S, the aircrewman in the cabin are much more prone to back pain than the pilots.
install better seat cushions with improved lumbar support
INVEST NTHE SUPPORT NOW OR THE VA WILL BE INVESTING IN THE RELIEF FOR YEARS FOLLOWING THE AVIATORS FLIGHT TIME.
It doesn't need to happen.
It hurts and is a consistent problem when sitting in a chair for a prolonged period.
It is a problem. On any flight, especially extended flights, the requirement to hunch over to fly causes a good deal of pain which detracts from safety and mission accomplishment.
It is insane that it is so difficult to get seats that are not uncomfortable none the less damaging. Has anyone considered looking at the seats in race cars and reinforcing them for our needs?
It is my understanding that Oregon Aero makes a complete seat pad replacement for the H-60 that costs LESS than the standard seat pads. As this is a COTS solution, I feel the Navy should look into approving and acquiring these for all H-60s. Additionally, having a chiropractor onboard NASNI is extremely helpful, but he is overworked. We actually need two, or TriCare needs to allow us to see chiropractors off base. This is a case of "an ounce of prevention is worth a pound of cure"...not to mention the amount this could save the government in future disability benefits.
It is not fun and makes me want to switch airframes
It is part of the deal, I don't believe it could be eliminated completely.
It is real and it is debilitating. NEED cushions or improved seats NOW.
It is something you just have to deal with I guess
It is very sad that no legitimate improvements have been made to the seating in a platform that has so few restrictions on what could be done to change the seats, i.e. no ejection seat!

It is very true that, unless my pain was extreme, I am hesitant to go to medical about back or neck pain for fear of being put in a down status.
It is worse on longer flights. There is no room to stretch or change position once airborne in a H-60.
It needs to be recognized. Thanks for doing this survey.
it sucks
It sucks.
It would be helpful if it was legal to use supplemental seat cushioning in the H-60!
It's worth the discomfort.
I've found myself having to think and force myself to have better posture in the aircraft as my hours have increased. I can't tell if the helo hunch is the reality of flying helos, or a snowball effect created by the weight of the vest as described above.
Just a couple note on the anthropometric question/down aircraft question: when I was downed for anthropometrics, that happened in flight school (all "outside the norm" flight students had a cockpit-fit by a flight physiologist in all training command aircraft). As written, the question asks about 4 anthropometric measurements (there are/were 6) and only asks about a handful of fleet aircraft, when, in my case and I assume many others, we were downed for whole classes of aircraft (ejection seat, in my case) because of at least one of the anthropometric measurements and/or their consequences.
Just have the VA make every helicopter pilot get a mandatory 30% disability.
Legacy H-46 crewman have complained about back pain experienced following their transition to the H-60. The small cabin combined with the dynamic nature of their job maybe leading to back pain issues for them.
Literally every helo bubba I know has complained about back pain. THIS IS THE #1 HEALTH ISSUE FACING HELO PILOTS!
LONG FLIGHTS IN VERY UNCOMFORTABLE SEATS CONTRIBUTE TO BACK PAIN.
Look to the long-haul trucking and sport-car industry to adopt COTS solutions already in use.
Make sure the VA recognizes that we're all going to be deaf and have bad backs, and we're not going to tell anyone about it unless it's anonymous, or it's our check out physical...
Many people will go to professional massage therapists as another source of relief from flying associated pain
Massages help. Free massages for helo pilots?
message therapy helps tremendously.
More lumbar support would definitely help.
More lumbar support, better seat angle, and have the option to go with a lighter style survival vest (at least for home guard training). I personally loved the old dry vests used in the HTs.
My back hurts so bad after a +4 hour mission that I usually need to lie on the floor of the ready room for about 20 min.

my back pain is related to posture. I lean forward when I fly in order to fly comfortably. When my back starts hurting I have to try to sit straight up and I tighten the shoulder straps as much as physically possible to keep my back straight against the back of the seat
My back pain seems like it is something I now have to live with for the rest of my life. I am a person who is in great shape and very healthy. I even do yoga to keep it stretched out but have found little effectiveness in pain elimination.
My back problems likely would have occurred even if I wasn't flying. However, I do believe flying has further aggravated my condition.
My lower back was a mess and I got very intense pains through my legs. A chiropractor cleared it up. But he's tough to see because he's so busy. We need greater access to chiropractors as par of military medicine.
My neck pain is becoming more of a regular occurrence. I am sure the long term effects will not be good.
nature of the job, but more controls could be implemented
Navy helicopters way behind other helos (Apache, Comanche, etc) and tacair aircraft in seat/flight control ergonomics
New seats with better lumbar support would help, but if the seat pads similar to ones purchased by pilots like myself would make a much larger impact. For NVGs, we could add sand bags like the Coast Guard does to offset the added weight on the front of the helmet.
No one trusts medical to tell them about it
noticed it just yesterday after a 2.0. it's getting worse.
One thing not covered in this survey is the helmet we wear. I've worn and flown with both the Army and Coast Guard helmets and I believe they are 1000% better than what we currently wear in the helo. Lighter, breathe better, just overall better than our current helmet. Adding weight to the head only exacerbates any neck and concurrently back pain.
Pain is mild to non-existent unless in the aircraft for extended periods of time (3+ hours) at which point it gets exponentially worse.
Perhaps something can be learned from the automotive industry regarding seat comfort/adjustability.
Pilots should feel free to get a chiropractic referral without the fear of being downed when meeting with the flight doc. I went to my first visit after 6 months of pain, and outside of the military, because of the fact that I was afraid of being put in a down status right before deployment.
please have massage covered by tricare...that is the only thing that helps
Please help with this. I have already bit the bullet and started yoga to try and help my posture, but the 'helo hunch' is real and will affect us all later in life.
Recommend a chiropractor be included on long form physicals. Most helo pilots have bad posture in and out of the aircraft due to long flight hours in helo seats
Seat cushions are key. Pilots do need to take some responsibility and MAF seat cushions to be replaced frequently. As a Det OIC I had the seat cushions replaced every 3-4 months. However, the seat cushion lack a lot in terms of their ability to

isolate the body from vibration.
Seat/cockpit design is essential. We need a seat that allows us to sit high enough to see over the glare shield, with the pedals close enough to us so that we can muscle them around in the event that we go "boost off", all while allowing us to sit in a proper, supportive body position.
Seats need a major redesign.
Seats with lumbar support would be amazing.
Seems that around the 1300-1500 hour mark is really where I started to feel the most discomfort on a daily basis. Before then it would be only after really long flights....7.0 and more. After that mark it seemed to happen on 4.0 flights and even less at times.
Spend more money on the buttocks cushioning, this would go a long way for comfort, especially long flights. I'd be interested to try a better lumbar support. Lumbar padding in my airframe (H-60F/H) was nonexistent, so it's hard for me to say if real Lumbar padding would help me.
thanks for doing the survey
Thanks for doing this survey. Hope it helps affect change in our aircraft.
Thanks for looking out for us.
The helo hunch is the cause
The more years I fly the more the pain stays longer and longer. There needs to be some improvements so we are not destroying our bodies.
The Navy should invest in preventive strategies at sea and on shore to minimize back pain and prevent high long term medical costs.
the outward visibility on the h-60 is notoriously bad; future aircraft should have better visibility, such as the old h-3 and h-2 had.
The seats are horrible and either need to be changed or they need to issue aircrew that request it, supplemental seat and lumbar padding similar to that available from vendors such as Oregon Aero.
The TH-57 seats were far worse than what I have experienced in the H-60, the H-60 is not great but it typically takes two three hour flights to cause some back pain but I not necessarily think that is avoidable, the TH-57 on the other hand caused chronic back pain through just six months of advanced training, at age 24 I was having to do stretches every morning after waking up so I could stand up straight when we were doing only two hour bags per day, most of the HT instructors had to have unapproved seat cushions they purchased themselves to keep from having severe back pain during a two to three year tour
The vibrations are continuous and having more ergo designed seats would greatly help.

<p>The way the cockpit is set up now, it is impossible to sit with good posture. If you straighten your back, and lean your head back, you will hit your head on the circuit breaker panel. If you adjust the seat so you can reach all switches with the harness locked, then you will not have full deflection of the controls. Most importantly, in order to utilize the entire windscreen, and maximize your outside scan, you have to sacrifice seeing a portion of the master caution panel, and you will have to look down every time you scan the gauges. The posture that is required to fly this aircraft effectively does not promote good health, especially if you are going to be flying for any more than 2 hours.</p>
<p>there is a connection between flying the H60 and back pain. I feel like there are going to be a lot of vets who will be fighting back pain the rest of their lives due to flying helos.</p>
<p>this is avoidable and correctable but the entrenched, risk adverse engineers embedded within the NAVAIR machine need to get off their butts and do some real work. This issue has been raised over and over again and yet nobody does anything about it. DO IT!</p>
<p>Unfortunately, I think it comes with the job. If we could fly in lounge chairs, then maybe we could avoid these pains.</p>
<p>Unless there is a very real hazard imposed by allowing a comfortable seat cushion, I think basic ORM would dictate that they should be encouraged. We constantly look at human causal factors in mishaps, and how many mishaps, hazreps, and near mishaps, may have been aggravated by a pilot experiencing back pain? The number of incidents in which back pain is a factor would almost certainly be under-reported because it was at a typical level, and not necessarily at a conscious level during the incident due to stress / adrenaline response. But, just because an irritant is standard does not mean that it does not detract from a person's ability to focus and maintain the high SA required over long flight windows, in which multiple small omissions of awareness or focus can snowball into a mishap/near mishap. And, due to the nature of memory to emphasize the ending portion of an event in memory (see studies of measurement of happiness or pain as remembered versus as reported during an experience - i.e. the personal narrative), the vast majority of pilots who had decreased SA due to back/neck pain will be unaware of the extent of the pain's impact as the personal narrative was focused on the mishap and the adrenaline, not back pain/bladder pressure/etc. While all of these things reduce SA, they will not be remembered as primary causes, and may not even be reported at all, because the strongest memories will be all related to the mishap itself. Thus, a possible under-focus on the part of Naval Aviation on the small, SA-reducing factors that add small holes in the swiss cheese that seems to surround mishaps.</p>
<p>We as pilots rely on the military to produce an effective fighting helicopter but for the longest time I feel this has been ignored due to minimizing cost. In turn, cutting cost will affect us in the long run with long term medical cost. I believe that the military has known about this back issue for a long time but has chosen to ignore for whatever reason.</p>
<p>We joke about it but it's something that we all have to deal with.</p>
<p>We need better seat cushions and ergonomic design, and slightly more space in the cockpit.</p>
<p>We need really good physical therapy and exercises available to utilize (since we all know that cockpit design will not change that much).</p>

What has to happen for us to make changes? Most people complain that they are uncomfortable, why haven't we made a single change in 20+ years? My back and neck keep getting worse and eventually I'll reach a point where I can no longer fly.
When it turned out I needed surgery for my back problem and was going to physical therapy, about 15 people came to me to ask 'under the table' questions about how they could help their own back pain. Clearly there are more people with back pain who are not admitting it.
While not a solution, routine chiropractic care is an effective countermeasure in maintaining spinal health. I know several Naval Aviators (self included) who would have been med-down without it at some point in their helo career. Simply acknowledging that it may be necessary, and isn't automatically a downing factor would go a long way towards improving the general health of our pilots.
WHY IS NOMI AND THE VA NOT MORE INTERESTED IN FIXING THESE PROBLEMS? THEY ARE THE ONES STUCK WITH THE RESULTS AND MEDICAL BILLS LATER ON.
yes it is ubiquitous among helo bubbas
Yes, I was med down for a year and only through exceptional physical therapy and a waiver was I able to resume flying. the seat is better now, but the underlying physical motions have not changed and I believe they will continue to cause repetitive or chronic injuries. I recommend also a future study to be conducted on the stresses of the aircrewmembers in the back of the helo.
Yes, this project or another should be focused on the aircrew gunner and passenger seats, as well as a better aircrew restraint system. The length of mission we fly originally was for 1 hour 45 minutes. We routinely go 4 to 6 +. The aircrew go to medical because of being strapped into their seats for back/neck issues.
Yoga and core stabilization stretching has made all the difference in my pain management. If we can't fix the equipment, this is the only option beside medicine/surgery
You get used to it, it's pretty much a common theme that I believe everyone experiences. It sucks, but I doubt any funding will ever be spent to completely eradicate it. The seats are, to my judgment, suitable.



## APPENDIX O. SUMMARY OF COMMENTS ON SEAT DESIGN

From question 51 of the survey, “Do you have any comments about seat design which you believe contribute to back and/or neck pain?” the following appendix was created. The comments were slightly edited for typographical errors and misspellings. Comments were selected if feedback could be beneficial for NAVAIR engineers and/or decision makers of the NAVAIR Community.

5 point restraint when cinched down tends to apply significant pressure on the back and compressing the discs.
60 seat needs lumbar support.
A better suited seat, more cushion, lumbar support, or the ability to use a supplemental seat pad would alleviate some of this pain
A lower lumbar support would be nice, as would better cushioning in the seat.
A more adequate lumbar support would help reduce back pain. I have noticed that my back pain is much more severe on flights where the removable lumbar support is missing or not installed.
A redesigned lower lumbar support pad would be ideal. The flimsy slim pad design of the current supports pads do not help.
A short flight for me is 4 hours, and many are 5-6+ hrs in length. Usually sometime after hour 3 or 4, my legs become uncomfortable, so if I could have anything, it would be a seat that was more comfortable for my legs.
a very slight aft tilt would probably go a long way as well as some legitimate padding (not an air pad)
Absent lumbar support. The lumbar support that comes with a new seat falls off rapidly and is not replaced.
Add a lumbar support.
adequate padding and lumbar support
After more than 3 hrs lower back pain can start to degrade SA and make thing miserable. During deployment it is common to fly 6 hrs a day.
Aircraft seats should be more like car racing 'bucket' seats. When you are sitting on a flat piece of Kevlar, it's extremely uncomfortable, and everything tends to slide forward, resulting in the helo hunch. I don't understand why I can go to a Suzuki dealership, and a 12,000 dollar Sidekick has a seat where the bottom is shaped like a bucket, and it's comfortable, but in a 20 million dollar aircraft that I sometimes sit in for 8 hours at a time there is a Kevlar bench with a half inch thick cotton pad on it.
Allowing the seat to go further back would improve flying position

Allowing the seats to recline when in steady state forward flight may be an option. Even a slight recline would alleviate back pain on long flights (double bags). Also better lumbar support is a must.
an adjustable seat like those found in autos would be ideal.
An ergonomic personal seat and back cushion made for each individual could ultimately save the Navy money on disability, even though it could be a very expensive initial cost.
Anyway we can change seat to stop the typical "hunch"?
Approve additional seat padding in the H-60 as is the case with the TH-57
Bad padding, poor lumbar support
Being able to recline
Better cushion and support (middle back and neck). Add a cooling system to it for the hot days in the summer and in the Gulf.
Better cushioning and lumbar support
Better cushions and a more ergonomically shaped seat.
Better cushions and durable ones. When a new seat is designed please have helicopters with experience test the new seat and do not leave it strictly to engineers to design that may be cost efficient but worthless for the pilots.
Better cushions and we need better lumbar support
Better cushions, replaced regularly - not based on wear but hours of flight.
Better ergonomics would go a long way. crew/pax seats in the 60S are absolutely horrendous, however. I truly hate having to ride in the back because of how uncomfortable it is; I definitely get more pain from being in the back.
better lumbar support
Better lumbar support and better bottom cushion
Better Lumbar support and seat cushioning. I have purchased an extra seat cushion through Oregon Aero with my own money that alleviates a lot of the pain. I have difficulty reaching the farthest switches when my harness is locked.
Better lumbar support would be nice.
Better lumbar support would help.
better lumbar support. something to relieve the "helo hunch"
Better lumbar supports would reduce back pain instances.
Better padding and less vertical seat
Better seat cushions! or a program to replace old ones, after a year or two of flying, they are thin as paper.
Better support. Lean back a little
Between the seat and the vest I am slouched over the cyclic for the whole flight and it really beats down on my back.
could be better designed
could have better lumbar support for long flights

Current design has a completely crap lumbar support system. I understand the need to be straight up and down but I'm sure a system could be designed to allow more adjustment in the seat whilst still getting ones posture back to the proper crash position prior to impact. I have consulted with a company called Martin Baker who are currently trying to develop more ergonomic helicopter seat designs. They incorporate Oregon Aero products as well as their own innovations for other services, I just don't think the Navy wants to pay anything for these devices...
Current lumbar support is insufficient and inconsistent.
Cushion is definitely insufficient. Sometimes even with just 1 hour into the flight, it becomes very uncomfortable to be locked into the seat and not be able to move around. It becomes a distraction throughout the flight.
Cushion, adjustments
cushions
Cushions and support in older model aircraft seem insufficient and are uncomfortable.
cushions are worn out and provide no support, lumbar cushions end up being flat and provide no support
Cushions need to be better and have a 6 month life cycle.
Definitely need more lumbar support.
Definitely the lack of a stroking seat in the YH-57 was a concern when I was an instructor
definitely poor padding, lumbar supports only last a few weeks before they are destroyed but since they are still "serviceable" (able to be attached to the seat) they aren't replaced or don't count against the aircraft. And I would never MAF one because I would have to listen to all the ribbing from maintenance for the rest of my career.
Design a more ergonomic seat that promotes better posture in the helo.
Design lumbar support that holds up to a beating.
Desperately need a seat cushion. The Sikorsky cushions are not effective
Didn't have any issues in the SH-60F. They had better seat cushions.
Each pilot has a little different body shape and has a different idea of what would be the optimal seat design so I can see how it would be very difficult to design the perfect seat/seat cushion for everyone.
Especially in the HH-60H the Kevlar lined seats are very hard and make for a sore back at the end of flights
First and foremost, lumbar support across multiple H-60 series is woefully inadequate. Furthermore, in the 60F and 60H the seat cushions were thicker than those in the 60S. While the 60S cushions inflate, they rarely remain fully inflated during flight, rendering them nearly useless for their purpose of cushioning the seat.
For me, I feel as though it's the inability to sit comfortably because of trying to reach everything.
Forget the inflatable cushion. Just give me good foam pads.

H-53 Seats and cockpit layout are the number one contributor to the back pain that I experience. There are experimental seats that are installed in 2 aircraft at HM-15 and I have flown with these seats a handful of times. These new seats COMPLETELY eliminate my back pain, even on flights exceeding 4 hours.
H-60 has seats that are flat as boards. Cushions wear over time, especially the lumbar pad. More ergonomic seat and better cushion would improve significantly.
Hard, uncomfortable, bladders never work.
Having a completely vertical seat back which lacks adequate lumbar support is probably the biggest factor.
Helicopter cockpits could have a more ergonomic design focused around preventing pilot fatigue/pain, but better seat cushions would be a great step.
helo hunch position of the seat doesn't help
HH-60H seat and cockpit is awful for tall people
HH-60H seat is horrible because there is very little padding and it leans forward. The MH-60S is a little bit better, but still leaves much to be desired in terms of comfort. I have used an inflatable cushion for more than 5 years to help alleviate the shortcomings of the seats with decent success.
Hunching over and bent/squashed lower back position. Need stronger lumbar support.
I am not sure if is the seat or the general seating position while flying
I believe a better lower back lumbar support would be beneficial for use in the cockpit.
I believe an ergonomic back and neck rest may help alleviate these conditions and discourage "helo hunch".
I believe that better seat cushioning, more lumbar support, more seat adjustments, and a better NVG setup would solve my pain problems.
I believe the condition and design of the seats is the biggest factor affected back pain that could be changed.
I believe the inability to tilt seat fore/aft contributes the helo hunch.
I consider the biggest contributor the design of the seat belt. The upper body supports do not strap you to the seat, like the lap belts do. As you tighten your upper body straps all you are doing is bearing down on your shoulders and exacerbating the "helo hunch."
I don't know if it would help the back, but I think a memory foam seat would be much more comfortable.
I feel a seat with a slight recline would be helpful
I feel that the overall ergonomics of the aircraft are significant contributing factors.
I flew the H-60F/H, which are being phased out, but the seat design for the HH-60H was particularly bad. It tilted forward slightly, had very little padding, and made for very uncomfortable long flights. It was even worse if flying with body armor, weapons, etc.
I have an ergonomics background and have a qualification from OSHA to assess ergonomics. The seats are ok, but I understand that there is not much that can be done for a 'stroking seat' that is design to save our backs in a crash or hard landing. The lumbar support addition that can be adjusted up and down helps out a lot.

I have never been in an aircraft with a new or "cushy" seat cushion. They are always flat and worn out.
I have seen a lot of the padding on the back of the seat tearing off from the top down. The maintainers have a hard time keeping the padding attached to the seat and it starts to double over on your lower back with no padding around the shoulders.
I heard less complaints about back pain when extra seat cushions were still legal. I would say that at least 1/4 of the 60 pilots I know with over 1500 hours have experienced significant back pain.
I notice a big difference in my back related pain when I drive. In a newer luxury type car (better seat/lumbar), I have less pain than in the compact car I own. My driving posture in the seat plays a huge role in my back pain.
I notice myself hunching over in the "Helo-Hunch" from time to time, this is something that would be difficult to avoid as it is natural to hunch down over the controls when you concentrate.
I think an increase in the cushion of the seats will help. The air bladders that we now use do not hold the air for long, and when they are pumped full of air, they feel as hard as sitting on a seat without any cushion. Also, lumbar support is severely lacking in our seats. I fly the entire flight feeling like I am bent over the controls. If I lean my head back and attempt to stretch my back, the back of my helmet impacts the circuit breaker panel, which could, potentially, lead to a safety of flight issue.
I think our seats need to be looked at for ergonomics
I think that Lumbar support needs to increase and a tilt feature would decrease pilot/aw discomfort.
I think that the seats are designed to be functionally effective, aid in stroke attenuation, and allow for ballistic protection. I am not sure why no consideration in the seat cushion seems to be made towards effective comfort during long missions. Or pilots are at least given the option to bring a cushion if one requires it.
I think the lumbar cushion is the key...they need to be in good shape
I think the seat in the H-60 is sufficiently padded, but too upright. Most other aircraft have a slight declination to the seat, resulting in a more comfortable/sound seating position. Tilting the seat would eliminate the poor posture "helo hunch."
I think the seats could have more padding and allow a little more room to move.
I think there could be better lower back support. Using the seat inflation only really gives cushion, not support.
I took various ergonomic/biomechanical classes in college. From those classes I would say our seats are poorly designed and lack proper contour (specifically in the lumbar region) and are not sufficiently cushioned. I understand this may be due to impact requirements, but the likelihood of experiencing back pain while flying helos is much higher than having a severe flight related mishap.
I understand that the seat backs have to be vertical to help withstand impact in the event of a crash... but people don't crash that often, and we're still breaking our backs...

I was able to use one of the supplemental seat cushions from Oregon Aero one time on a 3-hour flight, and it drastically reduced the discomfort.
if the seats had just a couple of degrees recline I think it would prevent the "helo hunch"
if we had better lumbar support, I think my back issues would be solved. the major cause of pain for me is my posture
I'm no doctor, but they're certainly uncomfortable and my back is stiff after flying.
I'm not a fan of the inflatable cushions (don't want to put my mouth on them), also, the velcro backing wears down and causes them to not remain in their intended position
Improve the lumbar support
improved design. sometimes we are in the seat for 4+ hours.
In my opinion, I think the current harness in the SH-60B enforces the "helo hunch" because my shoulders are well above the slot where the top of the harness retracts into the seat. The harness curves around my shoulders and creates a "helo Hunch" every time I lock the harness. Is it possible to recline the cockpit seats a little?
Induced "helo hunch"
Infrequent replacement of seat cushions or durability of the cushions.
Install cushions that work with inflatable supports that actually make sense. The current balloons are the size of a large apple. Who finds sitting on that comfortable. Currently the other option is no cushioning.
Insufficient Lumbar Support
insufficient seat cushion, angle of seat, lack of lumbar support
It does not seem that the ergonomics of the "whole" pilot station (i.e. seat, controls, screens, switches) are necessarily fully considered when designing the aircraft.
It doesn't appear that we have factored ergonomics or long term fatigue into the seat design. No ability to effectively adjust lumbar support.
It is too upright and does not provide enough padding, I also fear in a crash my head will hit the cyclic
I've not studied/scrutinized the seats enough to answer.
lack of cushioning and lumbar support
Lack of ergonomic cushioning.
Lack of lumbar support is the main issue
Lack of lumbar support, poor seat cushion
Lack of lumbar support.
lack of support - both padding and basic seat construction.
Little to no lumbar support. Insufficient seat cushion.
lots, could we please design one with a pilot in mind, not weight savings.
Lumbar cushions are great...when they work. In about 1/3 of our AC, they don't hold air. The seat in the TH-57 is the WORST! Terrible ergonomics. 90 degree angle between the back and the seat cushion. Lower thigh is not in contact with the seat cushion due to the seat only being about 10 inches off the deck, causing crazy arching in the spine.

LUMBAR SUPPORT
Lumbar support and adjustable height collective would relieve all pain.
lumbar support and cushioning are unsatisfactory and need to have a better design and endurance and adjustable
Lumbar support and seat cushion padding. Angle of seat s pure 90. Should be tilted backward slightly.
Lumbar support and seat padding are worn in all Bravo model aircraft and that is what I have 85% of my flying time in.
Lumbar support and seat pads should be engineered with medical personal closely involved
Lumbar support could be designed better and replaced more frequently
Lumbar support design is poorly conceived
lumbar support doesn't work.
lumbar support is not very useful. Falling off in most aircraft.
Lumbar support pads compress and wear easily. Seat needs more aft adjustment.
Lumbar support would greatly help
Lumbar supports need to be switched out at regular intervals due to wear, not just inspected.
Lumbar supports that get worn down and become ineffective. Kevlar seat pan does not allow for any extra movement
Make a seat with good padding and great lumbar support. If you do that then you will really reduce the numbers of back pain incidents in this community.
make better seat cushions.
Making the front of the seat pan wider would keep it from restricting blood flow in my legs. More padding on the seat would aid in seat comfort.
Material compresses way too quickly and the lumbar support is worthless.
May be more comfortable for pilots if it were possible to adjust back support to greater than a 90 degree angle.
Maybe a little more support as far as cushioning goes. I really feel the seats in the back of the MH-60 that the aircrew use are horrible for their backs. They have no cushion, and they still have to sit there just as long as the pilots.
MH-53 seat cushions are insufficient.
MH-60S seat lacks any cushioning and contributes to poor posture flying.
More cushion in the pads would be great
More cushion in the seats with a better lumbar support. Design something with the typical 4-5 hour mission in mind with memory foam or similar type material.
More cushioning or supplemental cushioning would be nice. Many aftermarket products that are expensive but are highly lauded by those that use them.
more lumbar support
More lumbar support could help, as well has better cushioning.
More lumbar support needed.

More lumbar support would be a huge bonus. I've flown with aftermarket cushion and find that extra lumbar support is huge when it comes to comfort for long flights.
More lumbar support would help.
More lumbar support, raise controls up higher so you can rest your arm on your thigh easier and see over the dash better.
more of an decline vice the 90deg
More support and more comfort
Most my helo back pain has been due to improper ergonomics. The MH-53E seats move fore/aft and up/down AND the pedals adjusted as well. This was great, the only problems was the range of motion w/the collective made seeing over the glare shield and bottoming the collective mutually exclusive. In the TH-57 the only thing that adjusted was the pedals so you have to cushion/support yourself into the correct position. The MH-60S falls somewhere between the two.
Need a lumbar support that stays with the aircraft.
need better cushion and lumbar support
Need better lumbar support
need better lumbar support!
Need better lumbar support.
NEED BETTER LUMBAR SUPPORT. MORE BOTTOM CUSHION.
Need better lumbar support. Need to move around more in the cockpit
need better padding
Need better padding.
Need greater lumbar support and seat cushion thickness
Need more cushion
Need more lumbar support
Need to have seats with more lumbar and seat support
needs to be researched and improved.
No / inadequate lumbar support. Lack of cushioning on Kevlar seats.
No lower back support, and the cushions aren't replaced an a regular enough basis.
No lumbar support and thin cushioning.
No lumbar support, the seat position prevents proper posture.
No lumbar support.
No lumbar support. Being on the smaller side it is awkward and hard to find a good medium where I can see and use the collective full range and reach all switches.
No recline position. Cabin seats are worse than pilot seats. Helmet makes it impossible to put head back.
Not a very comfortable seat, too upright.
Not being able to sit back and comfortably control aircraft cyclic with fine control is the primary problem. Cyclic position dictates that when flying any high gain maneuver, that pilot is leaned forward over cyclic.
Not Enough padding



Not technically. I believe some sort of long term (3+ hour flights) shock absorption with lumbar support would be helpful. Keeping the s-curve in the spine is one of the biggest factors in overall posture and back health.
Nothing specific or terribly constructive, but they suck, and seem to be designed for a pilot body type completely unlike mine or anyone I know.
Our seats are worn and have poor back support. Even when I have used a brand new seat the cushioning is not up to par.
Our seats' current design is insufficient for ergonomic support. While NAVAIR's concern about keeping seats (and cushions) crashworthy is laudable, I would contend that distraction from back pain due to insufficient ergonomic support could actually contribute to potential mishaps. While trite, positive or negative "pilot comfort" can contribute positively and negatively to successful and safe flight completion. Comfortable pilots can focus on flight tasks and the demands of aviation...uncomfortable pilots shift their focus away from primary flight duties in order to seek out any way of establishing a comfortable flying position.
Overall lack of concern with regards to ergonomic design. Design essentially forces pilot to "hunch," which leads to poor posture and back neck pain. Lumbar support would GREATLY assist this issue.
Padding and lumbar support are old and inadequate. I think each pilot should be issued their own lumbar support pad.
Padding is often worn out and slides easily out of proper position.
Padding is too thin. Bladders only work if you manually inflate, which is unsanitary and not how they were designed. I think the adjustable seat height needs to be longer and get better seat cushions or approve seat pads.
poor cushion and lumbar support. Also, raising the seat high enough to allow for visibility over the glare shield requires the 'helo hunch' to comfortably manipulate flight controls.
poor lumbar support
Poor lumbar support
Poor lumbar support and overall seat ergonomics. In my case did not cause significant back pain except after extended flights. Seat design could be better/more comfortable.
Poor padding and a very uncomfortable seated position.
Poor seat cushioning and ergonomics
Poor seat design in both the H-57 and H-60 that has contributed/cause my lower back pain.
Poor seat padding breaks down rapidly resulting in increased stress on the body and discomfort.
Put in better lumbar support or advocate the use of aftermarket cushions that are allowed
RIGID 90DEG ANGLES DO NOT SUPPORT THE SPINE.
Seat cushion design needs to be reworked.
Seat cushions in the H-60 are terrible, and worn on top of that.
Seat cushions lacking cush. Most cushion break down rapidly and do not isolate the body from vibration.

seat cushions should be realistic for 6-12 hour flights. Allow after-market cushions if you're going to deny us good ones
seat cushions that are replaced more often and a glare shield that allowed upright posture and full down collective positions would help the most with the "hunch".
Seat ergonomics - The action of tightening the shoulder harness does not keep the pilot's torso upright. The shoulder harness does not pull the pilot into the seat back with his/her back flat against the seat. Tightening the shoulder harness causes the pilot's torso to slouch and hunch over. The only way to sit upright is to loosen the shoulder harness to a point where it would NOT restrain the pilot in a crash.
Seat in the TH-57 cannot be adjusted.
Seat lacks lumbar support
SEATING POSITION IS RELATIVELY STRAIGHT UP, WHICH IS NOT CONDUCIVE TO GOOD FLYING POSTURE.
Seats are not comfortable / ergonomic
Seats are poorly designed in legacy aircraft. Like sitting on a metal box in the 60-Hotel. Sierra had some improvement.
Seats are too "vertical". Should be able to adjust angle somewhat.
Seats aren't bad if we would have the tubes that allow us to hygienically blow up the seats. The hunch is from the helmet and orientation of the CB panel in my opinion.
Seats do not have the adequate padding and lumbar support. They wear out too quickly and I am forced to buy after market seat cushions (i.e.: Oregon Aero products).
Seats don't encourage good posture, the padding in the seat is insufficient.
significant lack of lumbar support in H-60 cushions.
Small to no cushion. Insufficient lower back support.
Some way for me to be able to stretch my legs in flight (area around pedals) for long flights would be great
Someone needs to design an ergonomically correct seat and cockpit design for helos.
start over? seriously I don't know what you want me to say here. Perhaps let us use the supplemental cushions sitting over at the wing?
strict 90 degree angle
Stroking seats please!
TH-57 seats are inadequately padded. Most instructors brought extra padding, some of which may or may not have been properly fire-retardant.
The "new" cushions helped at first but no longer supply the required support.
The air bladders do a pretty good job of helping, but burn out somewhat quickly in-flight.
The air in the cushion is all gone by about a half hour. Perhaps a cushion that would stay inflated for the whole flight/a denser pad. I experience pain in my glutes from resting on a deflated cushion for 7 hours at a time.
The aircraft needs better seat/lumbar cushions.

The back of the seats need to be taller to allow those with long torso's to not have to hunch over. With the longer seats also need to have the harness reel backed up so the helmet will not impact the reel with NVG battery pack on.
The biggest problem I have is with the shoulder belts. When tightened properly they press down the shoulders, leading to the hunch, which leads to most of my upper back and neck pain.
the butt pads are basically flat in the SH-60B's
The current H-60 seats have insufficient and poorly designed lumbar support. The support pads are frequently worn out with the supporting velcro either broken or insufficient to hold the pad in place and the padding itself worn out.
The cushion can be improved and more lumbar support added.
the cushion is non existent and leads to lower back pain
The cushion is worthless. I don't know why my butt would need no cushioning and my upper thigh would need a ton. There's also no lumbar support. Rather than an inflatable cushion, I think a sturdy foam pad which would be cheaper and wouldn't create MAF's would be a good replacement. Plus sticking your mouth on that thing is disgusting.
The cushions and seat pans are terrible.
The cushions do not last. Additionally, I do not believe the seats are built with ergonomics in mind.
The cushions should be re-designed!!!
The design of the 46 didn't account for ergonomics in any way shape or form.
The design that makes you hunch to see gauges while maintaining a setting allowing you see the gauges. So maybe this is more a comment about the glare shield.
The glare shield on the H-60 is the biggest contributor to poor posture. It is difficult to find the right position to see all gauges below the glare shield and simultaneously see outside.
The H-60 lumbar support is often falling off or crushed, they need to either be replaced regularly or more sturdy ones installed
The Helo hunch sucks
the HH-60H armored seat slopes down to the front. The cushion is nearly useless, and that's the worst seat for pain.
The HSL community still needs to get new cushions in the cockpit despite it being a legacy aircraft.
The instructor seat and Rescue seat (SH-60B) are very ergonomically uncomfortable and lead to back strain if sitting in the seat for longer than a hour of flying,
The issue is not comfort...it is support. Look at the seats in a German sports/luxury car--they offer support in all different areas of the body, including lumbar and under thigh. Compare that to the couches that are found in your Grandmother's Buick. Over time, the more firm, but more supportive seat will ultimately be more comfortable and less fatiguing. Furthermore, the H-60 seat cushions and seat back cushions are held in place by Velcro, which degrades over time. This allows the cushions to slide around, further exacerbating comfort, support and reach issues.
The lack of a decent lumbar support is the largest contributing factor

The lack of good support or padding.
The lack of lumbar support and ridged 90 degree posture cause fatigue.
The lack of proper and sufficient lumbar support and seat cushion design. If the seat had a slight recline and proper lumbar support the comfort and long-term health of the pilots and aircrew would be much better.
The lumbar support in the 60 is useless and should be incorporated into the seat cushion padding or cut out.
the lumbar support is terrible. we need a larger support pad
The lumbar support is the main problem. It just doesn't work. The seat design is the second issue. The main reason for neck pain is NVG flights.
The lumbar support needs to be better. There is nothing I can do about the helo hunch, as I need to rest my hand on my leg, but a nice lumbar support is very helpful with that. In addition, flying in the current seat, when it is new, is great. but it deteriorated within maybe 60 flight hours on our det (so the seat lasted less than a month) but we couldn't replace it for much longer.
The lumbar support pads in the Bravo are almost always a source of pain rather than a relief aid. I would cut them out if my maintenance chief would let me.
THE LUMBER SUPPORT IS TOO SOFT AND IS NOT MAINTAINED. IT PROVIDED NO SUPPORT AND SHOULD BE REDESIGNED.
The MH60R and SH60B Pilot Seat lumbar support is inadequate. In older aircraft this lumbar foam has changed shape (flattened from aircrew sitting on it) and does not provide the support as originally designed.
The MH-60R seats are brand new and are still terrible. The padding does nothing. The lumbar design is horrible.
The new H-60 seat's inflatable lumbar support is a great idea, but the seat is too small for it to be of much benefit to me. If the seat had greater length from the seat back to the forward edge, thus allowing greater support of the buttocks and thighs, I think that would help.
The padding and lumbar support are inadequate. Additionally, the seat is so vertical that it basically forces the helo hunch. The lower seat cushion also slides around, making it impossible to achieve a consistent level of comfort.
The padding and seat armor in some helicopters leads to an awkward sitting position
The padding is very minimal and the lumbar support does not help much with posture in the cockpit
the padding isn't poorly designed, just usually pretty degraded.
The padding on the seat is insufficient
the pedals should be able to move further forward and the overhead CB panel should be aft another inch or so
The rigid design of the seat and the lack of padding do not help with supporting my back during a long flight.
The seat AND collective should be adjustable to prevent hunching.

The seat cushion is non-existent. The H-60 NEEDS a better seat cushion. After +2 hour flights, I am extremely sore. On a cross-country flight where we were flying almost 8 hours a day, I developed blisters from lack of seat cushion. These blisters caused severe discomfort, especially during the final stages of the cross-country.
The seat cushions and lumbar pads are easily worn out and should be periodically replaced once a year in the very least.
The seat cushions are horrible. A lot of pilots buy better cushions from Oregon Aero to help with the back pain.
The seat cushions are inadequate, don't get replaced often enough and wear out too fast. Not enough cushion or lumbar support. Also, it takes an act of God to get a new cushion.
The seat cushions are well below par for the amount of time we spend in the aircraft. The seat design could be better.
The seat cushions get beat up through constant use. I have seen 1 new cushion ever and it was in the same condition as the other seats within 2 months.
The seat cushions are horrible. They provide little to no support to the back and hamstrings.
The seat design for the ATO requires the pilot to crouch over and twist towards the center console in order to access the keyset and see the tactical screen. This coupled with the helo vibrations and heavy gear causes severe neck and back pain.
The seat design is archaic. I would guess it hasn't been redesigned in at least 35 years.
The seat design must be improved to avoid having so many helo bubbas with neck and back pain. Poor lumbar support, seat ergonomics and vibration absorption.
The seat design needs to incorporate modern ergonomic lumbar support. The pad used in the H-60 is a joke.
The seat design seems to be an afterthought. I mean really... and the seats for the crewmen are worse! Let's not forget about them. When wearing my battery pack, I have to lean forward anyhow because the back of my helmet will hit the CB panel. The seat seems to be a perfect L-shape. Not exactly designed for long-term sitting.
The seat does not recline at all. It is straight up and down.
The seat doesn't provide any lumbar support and the angle feels like a forward leaning one. I believe if the seat had a little aft angle or even straight with lumbar support, the stress on the lower back might be improved.
The seat ergonomics are terrible. I fly hunched over all the time and will not fly without my lumbar support.
The seat has little/no lumbar support. Bottom seat pads provide little cushion. Ergonomically, the seat has to be so low (to achieve required eye level), that my thighs are up and form an acute angle with my torso (causing a constantly hunched forward and stretched lower back condition).
The seat in HH60H seems to be just at a 90 deg angle. The lumbar support pad is non-existent/ ineffective. I used a rolled up towel and press lumbar spine against it to maintain lordosis

The seat in the H-60 is awful. I feel that it contributes directly to the pain I experience during flight.
The seat is designed for someone to sit in, not to fly in. There has to be some lower back support for your feet being on the pedals.
The seat is good, it is the inability to move around and shift position throughout the flight that leads to the most pain.
The seat is very upright and forces one into a hunch.
The seat mounts should start a few inches lower in the seat pan to provide for a greater degree of stroking, and they should also be about 2 to three inches further aft. A different cushion (not the inflatable one in the MH-60S either) needs to be developed, there are many new materials that have been developed since the H-60 was developed that provide greater comfort. The "Fur" coating of the seats does not help either with increased heat reducing aircrew endurance.
the seat needs more support at the bottom of the back portion, since your gear pushes you forward a little bit. Also, the butt portion really needs to be better maintained.
The seat needs to have more clearance behind the head for the NVG pack.
The seat padding could be much improved, the lumbar support could be significantly better, and the supply system could have many more new seats. Seat cushions should be regularly replaced, perhaps once every 364 days.
The seat should be able to recline just slightly. Not like a lounge chair but just enough so the weight is placed on the whole back and not only on the lower back.
The seat should not be a right angle
The seatbelt when tightened pushes you down and hunched over in the seat instead of pulling your shoulders back which would make you sit upright. That is the biggest factor in my opinion
The seatbelts in the flight station are poorly configured. In an MH53 you can't tighten the seatbelt to that you're tight against the seat due to the position of the seatbelt where it splits to go over the pilot's shoulders. If you attempt to tighten it down it pulls you into a hunched position.
The seats are not comfortable at all. I feel bad complaining about it because our aircrew sit in seats in the back that are cloth stretched over metal bars. Not comfortable at all.
The seats are not shaped in a way that supports the back. A new back cushion with an ergonomic shape would do wonders to improve the comfort and health of the pilots and aircrew.
The seats are poorly designed for proper back support.
The seats are the worse! The Lumbar support is a joke! But it is what it is and we deal with it
The seats are too upright with inadequate/poorly designed support. Oregon aero has designed replacement cushions to help and ergonomic helo seats are available that still maintain the crash worthiness required. (Hughes did it with his helos when he was designing decades ago).
The seats by design are not ergonomic. We should be allowed to use seat pads for flights or spend the money on better designed seats.
The seats could be designed better or a way to replace cushions when worn out.
the seats could use some more lumbar support and a more ergonomic design

The seats in my platform (60R) are horrible. The cushions are thin, the lumbar support cushion is often distorted and uncomfortable, and the seat shape is a perfect 90 which causes the hunch.
The seats in the 60F and 60H have little to no lumbar support. This encourages the helo hunch
The seats in the MH-60S have little ergonomic benefit, and the padding and airbladder system are more of a joke than a help. Both get worn out and mishappen that they no longer provide benefit.
The seats in the SH-60F never bothered me. The seats in the HH-60H and MH-60S are the worse.
The seats need more cushion and are too vertical. The restraint harness needs to be adjustable from the floor to avoid groin rubbing.
The seats need to be reclined several degrees so the pilot is not hunched forward while the aircraft is nose down.
The seats ought to be a whole lot more comfortable by now, given advances in technology, materials, and understanding of ergonomics. Seats have not improved at all in the last 20 years.
The SH-60F and HH-60H seats need to be replaced with the inflatable seats used in the MH-60S.
The slouch is awful on my back. I'm not sure what suggestion to make for that but if more padding was added to the seat portion, it would definitely cut down on the leg numbness and pain.
The straight, non-reclinable seat back contributes to the "helo hunch."
The thin sweat soaked cushion does not do a sufficient job.
the top of the straps. the connection point is just below shoulder level so it would only make sense that when you tighten them down, they are going to pull on your body from that level, thus pulling down and forward on your upper body.
The velcro lumbar support is usually squished and misshapen, so often adds to discomfort rather than relieving it. Building it into the seat or incorporating an operable air bladder would be helpful.
There desperately needs to be better lumbar support.
There has to be a better compromise between crashworthiness and comfort. The current set up is brutal compared to legacy aircraft. I have 500 hours in the H-46 and experienced none of these symptoms in that aircraft.
There is a lumbar support cushion installed on the seat, but it is often flat and worn down. While the idea of lumbar support is there, the effect of it on back comfort is negligible. The "cushion" should be made of a more durable material less susceptible to deflation/flattening.
There is no lumbar support and I feel this is the reason for my lower back pain. I have since started using a seat pad with a lumbar attachment and it has substantially reduced my lower back pain.
There is no lumbar support in the helo. The padding that is placed there gets so old and 'smooshed' down that it does little good and just absorbs sweat.
There is no recline, no aid to proper posture. Lumbar supports are a weak attempt.
They could be designed better, but not sure how

they need to be corrected
Think about replacing seat cushions or design a chair with some type of ergonomics other than a simple 90 degree angles "L" shaped seat like most other platforms have.
Too upright.
Troop seats in the cabin are extremely uncomfortable and induce back pain almost immediately.
Vertical seat with deteriorating cushions contribute to a forward hunch that greatly increases associated pains.
We need better overall back/ lumbar support
We need better / newer padding. What is in the aircraft is 20 years old and doesn't work
When I raise my seat on click to put the pedals far enough away, I end up having to hunch over with the collective full down. Also the lumbar support (a cloth filled sock on a string with velcro to stick to the seat) is not effective. And the padding on the seats is non-existent.
While the seat is not comfortable, I don't think it's the problem. I think the main problem is posture and vibration.
Why invest so much into a seat that inflates and deflates? We not just a seat made of temporpedic to shape the contours of your legs and back, and spreading the weight of your body over a larger area. Inflation seats just break and now ur far worse sitting on hard Kevlar. If anything just inflate the lumbar, that would make sense. I flew with a Temporpedic pad for years and the results were great.
Why is an ejection seat more comfortable?...
Why is it so hard to get replaced cushions?
Worn seat cushions
Would be nice have slightly inclined seats like the air force.
Would like more lumbar support.
Yes - seat positioning and cyclic positioning cause a hunch. I don't care as much about the padding but I want a seat that doesn't hurt my back and allows me to safely fly the aircraft.
YES, Better lumbar/ergonomics
Yes, complete lack of lumbar support
Yes, I think we should take a page out of the auto racing industry and make our seats both safer and more comfortable
yes, it needs to be tilted aft on an angle to make it more comfortable.
Yes, it should have the ability to recline for longer / less dynamic missions.
Yes, seat backs are too vertical and should be reclined at least 25 degrees.
yes, seating configuration completely lack of lower back support. also, inaddiiton to adjustable pedals, collective should be adjustable as well. that would help.
Yes, the air cushions only inflate in the front right under the knees. If it inflated evenly then your butt wouldn't sink lower than you knees. If the entire seat would be tilted back a couple of degrees.



Yes, the collective should be redesigned so that short people can bottom the collective while there seat is adjusted all the way up so they can see over the dash.
Yes, The cushions for the seats needs to be greatly improved, My squadron has all brand new helicopters and the padding is already useless, after 2 hours of flying it feels like the comfort block in SERE school.
yes, the helo hunch combined with poorly designed uncomfortable seats and heavy flight vests (especially older body armor)
yes, the helo hunch puts pressure on the natural curve of the spine. because there is insufficient lumbar support and because you fly with your feet on pedals instead of flat on the deck, there is stress on the lower back. Due to the helmet hanging on your head and the shape of the seat behind the head the neck is pushed forward, so the weight of the helmet does not transmit straight down the spine, rather it pulls the neck forward. Pain and stiffness is the result.
Yes, the seats are poorly designed. I have a memory foam back roll that I use that helps some but if we're to spend so much time in a helo seat, why can't they design the seats better? Why can't we have an improvement in design for NVGs? Let the navy use some of the money they spend on useless items on R&D for seats and NVGs
Yes, the very poor and in most cases the lack of any type of lumbar support. Lack of lumbar support creates a cavity between the seat and lower back and puts an inordinate amount of strain on the lower back. Also, the "helo hunch" I think is exaggerated by the design of the seat. The seat as it is forces people to lean forward, but a slight aft tilt on the vertical of the seat would reduce that hunch as it naturally forces the shoulders back.
Yes. Need the ability to recline the seat, and more lumbar support for a more ergonomic seat with survivability in mind.
Yes. NO LUMBAR support doesn't provide an opportunity to even have good posture in the aircraft.
yes. Not being able to adjust the seat to have the back of the leg more on the seat instead of just the hip joints
Yes. I believe there is a simple engineering design that can alleviate a lot of the "helo hunch". Move the circuit breaker panels back a couple inches; or change the battery pack to a narrower size (then again, I have felt my helmet touch the circuit breaker panels as well, so option one is probably best).

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## APPENDIX P. SUMMARY OF COMMENTS ON AIRCRAFT CONTROLS

From question 53 of the survey, "Could aircraft controls or gauge positions be a reason for back and/or neck pain?" the following appendix was created. The comments were slightly edited for typographical errors and misspellings. Comments were selected if feedback could be beneficial for NAVAIR engineers and/or decision makers of the NAVAIR Community.

"helo hunch" for the cyclic is a definite issue
ADDITION OF HELMET DAY/NIGHT HUD WOULD ALLOW MORE HEADS UP TIME AND ARE AVAILABLE FROM COTS SOURCES RIGHT NOW. RECLINE SEATS AND MOVE CONTROLS TO BE MANIPULATED IN RECLINED POSITION.
adjustable collective at it's base to move up and down like the pedals in my car do so I don't have to reach so far to put it all the way down.
Adjustable control positions would be immensely helpful with back pain. The ability to customize control position both vertically and horizontally would allow me to sit comfortably and fly without hunching over.
Allowing the seat to go further back would allow gauges in current position be viewed without issues
At times. If you want to be high enough up to have some seat stroke, and you are above 5'6", it can become difficult to see the gauges below the glare shield which results in stooping. In my case, I sacrifice most of my seat stroke and some of my over the dash visibility to prevent stoop.
Backup instrument gauges in the MH-60R are to small and only visible if you lean inward. Position repeater directly in front of both pilots.
based on how I am sitting in the seat and where I have to have my arm position to hold the cyclic causes my back to hurt.
bottoming out the collective on the ship deck is a bit straining since it is well below where we were sitting. long fcfs were difficult
Buttons on aft end of console force pilots to turn and lean over awkwardly to adjust. Could cause muscle strains.
Collective full down requires a significant hunch which is especially noticeable during long ground evolutions like FCF
Consoles can be lowered and seats could greater adjustments not just a few positions.
Control position could be an issue. Not wanting to obstruct full displacement of the controls leads me to accept a less than optimal seat position.
Controls yes, gauges no. Gauges seem to be just a scan - you can adjust your scan. Control positions force us into uncomfortable positions.
could be, but I don't think they are for me.
Create a HUD so pilots don't have to look down.

Cyclic and Collective location as well as dash board and height of seat (to see where you are flying) require a "helo hunch" posture to fly the aircraft
Cyclic could be designed so that in a normal forward flight position it isn't in a forward position contributing to the hunch. Helo pilots don't always hover where the cyclic is in a good position.
Cyclic is WAY too low in the full down position and results in a terrible hunch which is held for hours and hours at a time in the H-53 thanks to the reliability issues that effect the aircraft.
Cyclic position at higher airspeeds (fwd cyclic position) force the pilot into a poor posture.
Cyclic/Collective doesn't move with seat adjustment.
during long instrument flights...yes, otherwise no.
Fidelity of mission displays forces us to hunch over. Location of keysets forces us to hunch over.
For me, they are not. Having seen several other cockpit designs, I think the 60S does an excellent job of providing effective control and gauge presentation and positioning.
Gauge position is not ideal, but I don't see a good solution for that problem. The issue is having your seat at a height to see over the glare shield puts you in a position where you must crook your neck to see the upper gauges.
Having to put the chair up to see and then needing to lean over to have full collective range.
Heads down to work the tactical pages, so more hunching...
Hey I'm right there with you, I think HUDs would be awesome, but without degrading outside visibility, there is no way to get those panels any further up.
I always feel like the cyclic is too close to my crotch, allowing the seat to move further back would help.
I believe that the 60S/R designs have improved ergonomics.
I believe the lack of ergonomics in the design of the keyset contributes to my pain. If the keysets were angled towards the pilots it would help align our bodies with the keysets.
I have a long torso so I sit pretty high, flying with the NVG HUD was nice because many of the instruments were displayed in the goggles.
I have problems closing the aircraft door from a full open position. I strain my lower back reaching for the handle almost every flight (some aircraft's doors are closer than others, and don't require a long reach).
I have to raise my seat to see over the dash since it is too high. Because of this, I sit high enough that now my view is obstructed by the upper limit of the windscreen. So to see a normal view in front of me, I need to hunch forward to see over the dash and under the upper end of the windscreen
I think I'm just too small for the aircraft, I fit according to "measurements" but I have to put my seat pretty high up to see, but then hunch over to reach controls and to lower the collective all the way. I hate to say shrink the range of allowable size of people, but I sometimes feel too small for the aircraft, and I know people smaller than me who fly the same aircraft.

I think the gauges are actually in a pretty good position. One control reason for back pain is, like drummers, helo pilots sit with their feet off the deck for much of the flight, so all their weight is supported by just their torso. The legs/feet aren't able to take the strain off your back, like when you sit in a chair.
I would benefit from the instrument panel being set back farther towards the windscreen or higher up from the cockpit floor (without causing the upper edge of the instrument panel to be placed higher up).
If a helmet visor could be made to have most instrument information on the inside of the visor would help with the Helo Hunch.
If controls could be adjusted to eliminate my need to slouch it would relieve my back pain.
If I adjust the seat position to adequately see over the dash and reach the instrument panel, the cyclic and collective are too low for complete freedom of movement.
If the collective was raised, would be able to have seat higher for better visibility and not have to slouch with lower collective.
If the cyclic was slightly taller I could grip it without the hunch.
If the glare shield didn't stick out quite so far, I think people could adjust the seat to a better position and still be able to see both the master warning panel as well as what's ahead.
If the MH-60S glare shield were lower, I could lower the seat while still maintaining visibility over the nose. This would allow me to bottom the collective and see over the nose at the same time.
If the seat were able to recline, then the controls would need to be extended for better ergonomics.
I'm not sure its the gauge or control position that is the problem. More likely its the seat and vest design.
in order to see over the glare shield, you have to raise your seat, but from that vantage point, you have to lean over to see the gauges below the glare shield.
It could be, but they're not... However the backup instruments are the single most useless gauges I have ever seen based on size and position.
It is possible for neck pain, especially in the NVD environment, but otherwise I think they are a limited causal factor
It would be nice if the collective were a little bit higher, but it is a minor factor
lack of nvd cockpit in SH-60B requires constant movement and adjustment of the cockpit lights to see gauges.
master caution light causes seat position to be lower.
Maybe if the collective were just a little higher when it is bottomed out.
maybe they cause the helo hunch?
Maybe, the seat / controls / instruments location all contribute to one having to hunch over
No. Most of my problems in my opinion occur because of the posture required to sit while wearing the helmet, goggles, and vest. The posture is a side-effect of the gear.

Not being able to sit back and comfortably control aircraft cyclic with fine control is the primary problem. Cyclic position dictates that when flying any high gain maneuver, that pilot is leaned forward over cyclic.
not much with gauge/instrument position, but mostly collective position.
Not sure if relocating controls would reduce the helo hunch
Other than reaching the collective, not really. And I've got pretty long arms. So I'm not the only guy with this problem.
Partially. With seat adjustments the way they are, in the MH-53E cockpit it is difficult to reach some switches depending on the way you have your seat adjusted. This forces some pilots to have to unlock their harness in order to reach some switches.
Pedals / area above pedals where your legs are positioned should be adjusted to allow for full extension of long legs
Perhaps if when I wasn't flying I could push the peddles fwd more so I could stretch my legs on those long flights
perhaps the console being far away, but good posture flying instruments alleviates some of the pain associated with hunching
Position of collective relative to seat and glare shield.
Possibly because they are lower than typical scan/FOV
Possibly, but I have no issues with reach or sightline.
Possibly, due to location and the need to stretch to reach them.
Possibly. Due to the position of the cyclic, we have to hunch our backs to adequately control the helo.
Potentially, but not in my experience.
potentially. some items require a downwards scan to the center console.
seeing over the dash and having full collective range without the hunch can be a challenge. Also on older aircraft it feel as though you can not slide the seat back as far as necessary
sometimes the dash gets bent down and you have to move your head to see the uppermost instruments if you're sitting high enough to see over the dash.
Switch or circuit breakers in out of the way positions don't help.
The "helo hunch" is just part of the business. Not sure there is much you can do about it. Most pilots just live with the discomfort.
The Center console is huge in the H-60 which makes it difficult to see over the console and bottom out the collective at the same time.
The collective in the "full-down" position could be a bit higher.
The collective in the 60 appears to be designed to accommodate a certain fixed height and therefore the hunch is necessary.
The collective is low when bottomed and I have to lean left if to bottom it from the proper seat height.
The collective would be easier to reach without having to lean forward and to the left if it were further back.

The controls and ergonomical design is such that the best way to fly is to hunch over, which is incorrect posture and that leads to back and neck issues.
The controls are to far from the seat. Therefore a hunch is required to reach them.
The glare shield in the H-60 is the most ghetto design for such a sophisticated piece of equipment. I position my seat in the full up to take advantage of the full stroke should a crash occur. In this full up position, I must duck my head down to look under the glare shield in order to see the top part of the gauges. This drops my SA momentarily while I'm inside, could develop into vertigo and puts unnecessary strain on my neck and back as I'm contorting to look at gauges.
The glare shield in the H-60F/H probably caused the biggest issue for me - I'm not super short, but had to raise my seat most of the way up to see over it, which then caused the Sikorsky slouch so I could fully manipulate the collective. Does the glare shield really need to go as high as it does?
the glare shield is too big and forces a lower posture
The glare shield is too large, resulting in a need to sit lower, reducing the stroke distance of the seat in an emergency. A pivoting Collective (handle that raises and locks into place irrespective of the overall movement (similar to the telescoping feature of the left collective)) and a telescoping cyclic could improve ergonomics and comfort.
The HCU (flir control) in the MH-60s is known to fail and not stay in the up position. Even in the up position is positioned too low to use effectively without having to bend a weird angle to use effectively. Flights where more use of the HCU causes more straining and pain.
The helo hunch is a result of the flight posture. The seat ergonomics need to be improved with anti-vibration seat technology and lumbar support.
The helo hunch is definitely something that should be investigated and if it can be changed to improve posture.
The Master Caution is in about as good a place as it can be for everyone's visibility, but it consistently makes me lower my seat more than I'd like to.
The position of the collective may accentuate the poor posture with shoulders rolled forward. Positioning the collective in a way that allowed full control but kept your back in the proper posture would reduce the lower back pain.
The visibility in the H60 is pretty bad from the cockpit. Moving around to get a good scan is the most likely cause for the back and neck pain besides flight gear.
They could be. The pilot is sitting w/ seat directly perpendicular to floor. It would be a tough engineering re-do to give the pilot more visibility and a more ergonomic cockpit.
They definitely add to it, other than relocating the circuit breaker panels behind the pilots/copilots head, I am unsure how much can/should be done.
This hasn't been a factor in my experience.
Trying to use the FLIR especially with goggles on is painful. The mission display is too low forcing you to look downward for extended periods of time. This coupled with the lack of a HCU on the pilot side of a Sierra has left me with neck pain for a couple days after a 3 hour flight.
Unable to sit high enough to adequately see over dash and still bottom collective. Forced to hunch in order to adequately maneuver collective
use of an adjustable collective would be great

When the glare shield pad starts falling down, it makes it even harder to see the Master Caution panel while still able to see over the instrument panel.
While it is difficult to reach some critical switches from across the cockpit, I do not feel this contributes significantly to my back pain.
Yes - especially with the glass cockpits. Some of the tape gauges are pretty small - this leads to hunching over.
Yes because I should move the seat forward to comfortably reach the controls but do not for my own safety in the event of a mishap.
Yes because position of gauges/lights determines how often you need to move your head (either to see or manipulate switches, etc...).
Yes but not as significant as seat cushions, seat position, and aircraft vibrations
yes depending on what you are focusing on and where it is left or right in your scan
Yes having to look down at the gauges while sitting up high to see outside the cockpit is an issue.
Yes it could, although I don't know where they would go other than into a hud of some sort.
YES! The master warning panel is located in a very bad position under the glare shield (MH-60R). With the seat height properly adjusted to see over the dash, I have to hunch over to see all of the flight and mission display. A smaller, flush-mounted indicator placed directly above the displays would seem like a huge improvement. Even more so than poor lumbar support, I am convinced that this posture contributes to back pain in my lower back and occasionally between my shoulder blades.
Yes! maybe a slight angle to the upper consoles so the opposite side can see the switches better and a better angle to the circuit breakers. The back-up instruments are in an awkward position as well.
yes, a constant hunch and lean to the left
Yes, bottoming out the collective requires an odd bend in the back.
Yes, but pretty sure we can't change this much.
Yes, controls especially collective location (extreme low position) mixed with different axis movement of cyclic
Yes, develop a Day/Night Heads Up Display
yes, having to arch back laterally sideways to reach collective
Yes, having to hunch to comfortably control cyclic and collective puts my back at a weird angle, contributing to back pain.
Yes, I have to sit uncomfortably to try and reach everything while trying to still see out in front of the helicopter.
Yes, I need the hunch over to see the gauges straight on
Yes, I slouch so I can anchor my arms my leg so my control inputs are stable.
yes, if controls could be adjusted not just seat would allow for better seating positions
Yes, if there was a hud, there would be less of a reason to look down to the gauges and therefore keep better posture.



Yes, if we had an adjustable collective that you could raise/lower, it would help people with shorter arms be able to set their seat in a position so they have full range of the controls and can reach all switches in cockpit.
Yes, in order to get the right seat height to see over the glare shield properly, you have to set the seat in such a position that you reach down for the controls.
yes, reaching to the back of the center console is a twist that shoulders do not do well
Yes, the 60F is not equipped with NVG lighting and instead uses velcro which strains your eyes forcing you to sit closer to readily see the instruments.
Yes, the controls and cockpit layout cause you to constantly lean forward and makes most seat design and lumbar support ineffective in preventing back pain.
Yes, the cyclic. It is not practical to move its position. Prolonged time holding the cyclic with your forearm resting on your thigh forces the "helo hunch." The hunch is what drives the back pain. Both are necessary to be a helo pilot.
Yes, the helo hunch is a big contributor.
Yes, they promote poor posture. You are continually looking down and the gauges and have your arms outstretched in order to hold the controls.
Yes, while wearing goggles manipulating switches in a blacked out cockpit requires unusual head movements to see a switch with a handheld light.
Yes, you can't reach everything when locked in.
Yes. 1) There's no question outside visibility is severely restricted by the dash and glare shield. Experiment with removing large glare shield and placing small, individual glare shields around the MH-60S's MD and FD.
2) Collective should ideally adjust with seat height.
Yes. At times the cyclic requires the pilot to be hunched forward with the right side slightly off the seat back to properly manipulate it.
Yes. Bottoming the collective is hard when the seat is positioned such that you can see outside. It results in poor autorotations and left lean to keep the collective bottomed.
Yes. Built for smaller pilots, not larger pilots.
Yes. But what's the solution? Lower my seat during IFR flight? and have the cyclic in my chin and the collective in my armpit?
yes. controls are overall too low. you have to lean forward to get the fine control movements to smoothly control the helo. if the controls were raised up higher and the cyclic closer the seat could be raised to a sufficient level to see over the dash without leaning forward.
YES. Flying instruments requires a low scan, effectively tucking the chin slightly for extended periods.
Yes. For taller pilots, the instruments are too low forcing us to "hunch" down to read the gages. I always had lower and upper back pains after IFR flights.
Yes. Helos are not designed with the operator in mind. Often during flights pilots are force into unusually head/body positions that can not only cause pain, hit unintended switches, but result in debilitating vertigo from movement of the head to find poor placed switches/controls
Yes. I believe cycle and collective position encourage poor posture.

Yes. In my opinion, we are continuously looking down at our instrumentation which is not a natural posture. Heads Up Displays were designed for this while simultaneously increasing SA.
Yes. Looking back to flight school and simulators, dropping the seat down and hunching over looking at the gauges could result in back/neck pain. I did not do this in the MH-60S, but using that posture, combined with NVGs would lead to back/neck pain.
yes. Looking down at gauges during instrument flight or nvg's
yes. often times I find myself reaching to difficult places while remaining strapped in. I have on two occasions recently hurt my lower back reaching for something just behind the console
Yes. Perhaps if the instrument panel were angled toward the pilot's face this would alleviate the "helo hunch" position necessary to focus on the gauges.
Yes. The H-3 panel was not conducive to instrument flying, so you really had to hunch down and actively scan.
Yes. The helo hunch is a work hazard in the H-60.
Yes. The instruments, and especially the glare shield over the instruments, are sitting at waist level. So, If I am flying an instrument flight, or at night, I am staring down at the instruments, and this puts a strain on my neck. Also, the switches that are the most forward on the center consol, and the back up Attitude indicator, are very difficult to reach when the harness is locked. If I want to change the altimeter setting on the back-up Attitude Indicator I have to unlock my harness to reach it. The other option I have to be able to reach the back-up Attitude Indicator when my harness is locked, is to move my seat forward. But, if I do that, then the cyclic impacts my harness buckle, and the survival gear, when it's pulled aft. This now prevents me from being able to fully deflect the controls aft.
Yes. The SH-60B has a flat screen mounted flat against the glare shield offset to the right of the operator with a keyset below it. I constantly found myself leaning over to view the screen. The cockpit should be more encapsulating so that controls and display are oriented toward the operator.
yes. we talk about the helo hunch, but there is also a slight twist to the body due to the right shoulder being thrust slightly forward to manipulate the cyclic. So there is another force on the lower back.
Yes. Collective is in position where I cannot rest my elbow and thus have a tense left trapezius throughout the flight which results in pain after a couple hours.
YES. Elevating the collective position.
Yes. I can reach everything and see, but am short. It would be less strain if I did not need to have the seat high enough that I need to stretch my arm to bottom the collective.
Yes. My back pain is often a twisting type pain from leaning and twisting to see a switch or button on the overhead console or adjusting something like a circuit breaker that is on the center console but behind the pilots.
yes. sometimes I feel like I have to lean into the screens to read all of the small numbers. I do have 20/20 vision.

Yes. The cyclic should be able to telescope or move up so that pilots would not have to hunch over to reach it. A simpler change would be to use modern day backlit gauges which are glare resistant and do not require such a ridiculously large glare shield. The size of the glare shield causes most pilots to raise the seat in order to see over it. This in turn causes the pilots to slouch in order to reach all of the controls.

Yes. To sit where I want forces me to bend left to lower the collective fully.

yes--if you didn't have to hunch over to see the screens (MH-60S) then perhaps it wouldn't be such an issue

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